NSW da Vinci

Decathlon

An academic gala day
for Years 7 and 8

Cartography

‘Without maps all is lost’ (Anonymous).

Session 2

Team Number _____________
Background Information

Maps can unlock mysteries or create mayhem depending upon the skill and intent of the cartographer. The history of cartography reflects human history—exploration, political change, and wars as well as technological change from designing maps on bark to creating cartographic displays with computers. Cartography is the art of map making.

Let’s go and explore some more…..

TASK 1:

CARTOGRAPHY ANAGRAMS (13 marks)

Your task is to unscramble the following words to reveal each well-known term associated with cartography.

RECTMARO __ __ __ __ __ __ __
ATUDELTI __ __ __ __ __ __ __
RONHT __ __ __ __ __ __ __
EULDOGNIT __ __ __ __ __ __ __ __ __ __
NIRCETOID __ __ __ __ __ __ __ __ __ __
YGAROGEPH __ __ __ __ __ __ __ __ __ __
OJRNCPOITE __ __ __ __ __ __ __ __ __ __
NOETNOITIAR __ __ __ __ __ __ __ __ __ __
ARYHPOGTPPO __ __ __ __ __ __ __ __ __ __
HSTUO __ __ __ __ __ __ __
GDNELE __ __ __ __ __ __ __
LURRE __ __ __ __ __ __ __

BONUS MARK: Use the highlighted letters from your answers above to find an important mapper:

__ __ __ __ __ __ __ __ __ __ __ __
1906, San Francisco. An earthquake hit the Golden City of the Western USA, fires were triggered in the aftermath and the tragedy was magnified many times over. This photograph is a stark reminder of the incredible destruction of the earthquake and fire, taken by a camera, hanging from a kite. Not only does this give a graphic display of the damage, but it can also give a fresh perspective on why some parts of the SF city centre had a few pockets of buildings which were untouched, and supporting information to explain why other obscure areas on the fringes were burnt out.

1. At what perspective was this photograph taken? Birds-eye, Ground-level, Oblique, or Acute

__________________________________________ (1 mark)
Kite aerial photography (KAP) is a type of photography. A camera is lifted using a kite and is triggered either remotely or automatically to take aerial photographs. The camera rigs can range from the extremely simple, consisting of a trigger mechanism with a disposable camera, to complex apparatus using radio control and digital cameras.

http://en.wikipedia.org/wiki/Kite_aerial_photography

(4 marks)

2. Describe on which occasions KAP could be a good alternative to other forms of aerial photography.

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

________________________________________________________________________________________

Nazca Lines and Cahuachi Culture – (see over page)

The Nazca Lines are an enigma, huge geoglyphs also found in Egypt, Malta, United States (Mississippi and California), Chile, and Bolivia and in other countries. Nazca are unique because of the large number of them, 26 in total. No one has proof who built them or why. Since their discovery, the Nazca Lines have inspired fantastic explanations from ancient gods, a landing strip for returning aliens, a celestial calendar created by the ancient Nazca civilization - putting the creation of the lines between 200 BC and 600 AD, used for rituals probably related to astronomy, to confirm the ayllus or clans who made up the population and to determine through ritual their economic functions held up by reciprocity and redistribution, or a map of underground water supplies.
These enormous geoglyphs are only recognisable from aerial photographs, virtually no clues when standing at ground level. From this photographic evidence, it is clear that the primitive Cahuachi community built them nearly 2,000 years ago and mysteriously abandoned the area 500 years later. They would have had some purpose and the people had a very effective technique to create these images on the planes of Nazca – both of which were lost with the mysterious disappearance of this community.

Your task is to provide two pieces of information;

3. From this evidence, and discounting any extra-terrestrial interference, describe a possible technique (in the space provided below) how a primitive people could possibly create such structure?

_______________________________________________________________________________________
_______________________________________________________________________________________
_______________________________________________________________________________________
_______________________________________________________________________________________
_______________________________________________________________________________________
_______________________________________________________________________________________

(4 marks)

4. Describe a plausible reason for the disappearance of this community

_______________________________________________________________________________________

(2 marks)
The **Giza Necropolis** is an archaeological site on the Giza Plateau. Here is a photograph from a balloon gives a different perspective of the complex, and an appreciation of the massive undertaking by the people of that time. As with the Nazca Lines, many stories revolve around the mystery of their construction. This complex of ancient monuments includes the three pyramid complexes known as the Great Pyramids, the Great Sphinx, several cemeteries, a workers' village and an industrial complex. It is located some 9 km inland into the desert from the old town of Giza on the Nile, some 25 km southwest of Cairo city center. The pyramids were popularized in Hellenistic times, when the Great Pyramid was listed by Antipater of Sidon as one of the Seven Wonders of the World. It is by far the oldest of the ancient Wonders and the only one still in existence. On this map, clearly mark where they are found;

**TASK 3:**

a) Create an annotated line drawing of the above photo in the box below; *(6 marks)*
b) On this table, Name the modern day country where these mysterious and magnificent structures stood;

<table>
<thead>
<tr>
<th>Name</th>
<th>Date of construction</th>
<th>Date of destruction</th>
<th>Cause of destruction</th>
<th>Modern day location (country)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great Pyramid of Giza</td>
<td>2584–2561 BC</td>
<td>Still in existence, majority of facade gone</td>
<td></td>
<td>___________________________</td>
</tr>
<tr>
<td>Hanging Gardens of Babylon</td>
<td>c. 600 BC (evident)</td>
<td>After 1st century AD</td>
<td>Earthquakes</td>
<td>___________________________</td>
</tr>
<tr>
<td>Temple of Artemis at Ephesus</td>
<td>c. 550 BC; and again at 323 BC</td>
<td>356 BC (by Herostratus) AD 262 (by the Goths)</td>
<td>Arson by Herostratus, plundering</td>
<td>___________________________</td>
</tr>
<tr>
<td>Statue of Zeus at Olympia</td>
<td>466–456 BC (Temple)</td>
<td>5th–6th centuries AD</td>
<td>Disassembled; later destroyed by fire</td>
<td>___________________________</td>
</tr>
<tr>
<td>Mausoleum at Halicarnassus</td>
<td>351 BC</td>
<td>12th-15th century AD</td>
<td>Earthquakes</td>
<td>___________________________</td>
</tr>
<tr>
<td>Colossus of Rhodes</td>
<td>292–280 BC</td>
<td>226 BC</td>
<td>226 BC Rhodes earthquake</td>
<td>___________________________</td>
</tr>
<tr>
<td>Lighthouse of Alexandria</td>
<td>c. 280 BC</td>
<td>AD 1303–1480</td>
<td>1303 Crete earthquake</td>
<td>___________________________</td>
</tr>
</tbody>
</table>

(7 marks)

c) Using a number key label on the map below the countries you identified when completing Task 3a).
(4 marks)

Europe and Middle East

MAP KEY:

1. ____________________________________________
2. ____________________________________________
3. ____________________________________________
4. ____________________________________________

TASK 4:
20,000 Leagues Under the Sea (Jules Verne, 1870) – the Voyage of the Nautilus.

Twenty Thousand Leagues Under the Sea is a famous science fiction novel by, arguably the father of science fiction, the French author, Jules Verne in 1870. As the story begins, ships of several nations spot a mysterious sea monster, a creature which was sinking and damaging ocean vessels all over the world seas. The United States government finally assembles an expedition in New York City to track down and destroy the monster. Professor M. Aronnax, a French marine biologist and narrator of the story, who happens to be in New York at the time, receives a last-minute invitation to join the expedition which he accepts. Canadian master harpoonist Ned Land and Aronnax's faithful servant Conseil are also brought aboard. The group all boarded ‘The Abraham Lincoln’, a whaler which departed Brooklyn, sailing around the South American continent, past the treacherous Cape Horn, into the Pacific and followed the migratory paths of the whales; this finally lead them to the north eastern Pacific area, off the coast of Japan. Here, the Abraham Lincoln was sunk by the mysterious object, which was later discovered to be the fabled Captain Nemo’s secret vessel, the Nautilus.

Your task is to track the route of the Nautilus from the coordinates listed on page 10 by communications from Professor Aronnax. (Assume that the Nautilus must have sailed around South America but not Africa)

Mark, CLEARLY AND NEATLY, the DIRECT path on your world chart (map, chart is the correct nautical term for a map of the seas) from each coordinate, as the Nautilus would have to travel – points will be allocated for a neat clear path drawn on your chart. You will also need to answer the questions that may be linked to each coordinate. Good luck! (6 marks)
Route of the Nautilus from given coordinates

COORDINATES (10 marks)

1) 31°13’ N. 133°16’ E. What is the body of water where the Abraham Lincoln was sunk

2) 20°30’ N. 157°42’ W. The name of the islands which the Nautilus passed at these coordinates?

3) 34°57’ S. 150°30’ W. Mysterious Island (a.k.a. Vulcania Island re: Disney 1954 version) Fictional Island in a number of Verne’s novels.

4) 11°40’ S. 166°52’ E. The name of the island group which the Nautilus passed at these coordinates?

5) 12°11’ S. 96°53’ E. The name of the islands which the Nautilus passed at these coordinates?

6) 5°53’ N. 80°10’ E. The name of the country which the Nautilus passed at these coordinates?

7) 21°31’ N. 62° 0’ E. What is the name of the body of water that the Nautilus passes through at these coordinates?

8) 11°49’ N. 45°38’ E. What is the name of the body of water that the Nautilus passes through at these coordinates?

9) 35°29’ N. 27°22’ E. What is the name of the large body of water (sea) that the Nautilus passes through at these coordinates?

10) 35°N. 2° 0’E. What is the name of the rock guarding the entry to a famous sea at these coordinates?

By the way;
How far is 20,000 leagues? …. (Worth 2 marks)

As used in Jules Verne's Twenty Thousand Leagues Under the Sea, a league is four kilometre’s. The French ‘lieue’ – at different times – existed in several variants: 10,000, 12,000, 13,200 and 14,400 French feet, about 3.25 km to about 4.68 km. It was used along with the metric system for a while but is now long discontinued.
Present day; 1 league = 5.55600 kilometres

20,000 leagues = ????

Answer = ___________________________
NSW da Vinci
Decathlon

An academic gala day
for Years 7 and 8

Cartography Answers

‘Without maps all is lost’ (Anonymous).

Session 2

Team Number _____________
Background Information

Maps can unlock mysteries or create mayhem depending upon the skill and intent of the cartographer. The history of cartography reflects human history—exploration, political change, and wars as well as technological change from designing maps on bark to creating cartographic displays with computers. Cartography is the art of map making.

Let’s go and explore some more…..

Task 1:

CARTOGRAPHY ANAGRAMS (13 marks)

Your task is to unscramble the following words to reveal each well-known term associated with cartography.

RECTMARO  M E R C A T O R
ATUDETLI   L A T I T U D E
RONHT      N O R T H
EULDIGNOT  L O N G I T U D E
NIRCETOID   D I R E C T I O N
YGAROGEPH  G E O G R A P H Y
JRNCOPOITEO P R O J E C T I O N
NOETNIOITAR O R I E N T A T I O N
ARYHPOGTOPO T O P O G R A P H Y
HSTUO      S O U T H
GDNELE     L E G E N D
LURRE      R U L E R

Bonus Mark: Use the highlighted letters from your answers above to find an important mapper:

C A R T O G R A P H E R
1906, San Francisco. An earthquake hit the Golden City of the Western USA, fires were triggered in the aftermath and the tragedy was magnified many times over. This photograph is a stark reminder of the incredible destruction of the earthquake and fire, taken by a camera, hanging from a kite. Not only does this give a graphic display of the damage, but it can also give a fresh perspective on why some parts of the SF city centre had a few pockets of buildings which were untouched, and supporting information to explain why other obscure areas on the fringes were burnt out.

1. At what perspective was this photograph taken? Birds-eye, Ground-level, Oblique, or Acute

OBLIQUE (1 mark)
Kite aerial photography (KAP) is a type of photography. A camera is lifted using a kite and is triggered either remotely or automatically to take aerial photographs. The camera rigs can range from the extremely simple, consisting of a trigger mechanism with a disposable camera, to complex apparatus using radio control and digital cameras.

2. Describe on which occasions KAP could be a good alternative to other forms of aerial photography.
   - Danger zones
   - When trying to be quiet for surveillance/record
   - Markers discretion for other valid answers

   (4 marks)

Nazca Lines and Cahuachi Culture – (see over page)

The Nazca Lines are an enigma, huge geoglyphs also found in Egypt, Malta, United States (Mississippi and California), Chile, Bolivia and in other countries. Nazca are unique because of the large number of them, 26 in total. No one has proof who built them or why. Since their discovery, the Nazca Lines have inspired fantastic explanations from ancient gods, a landing strip for returning aliens, a celestial calendar created by the ancient Nazca civilization - putting the creation of the lines between 200 BC and 600 AD, used for rituals probably related to astronomy, to confirm the ayllus or clans who made up the population and to determine through ritual their economic functions held up by reciprocity and redistribution, or a map of underground water supplies.
These enormous geoglyphs are only recognisable from aerial photographs, virtually no clues when standing at ground level. From this photographic evidence, it is clear that the primitive Cahuachi community built them nearly 2,000 years ago and mysteriously abandoned the area 500 years later. They would have had some purpose and the people had a very effective technique to create these images on the planes of Nazca – both of which were lost with the mysterious disappearance of this community.

Your task is to provide two pieces of information;

3. From this evidence, and discounting any extra-terrestrial interference, describe a possible technique (in the space provided below) how a primitive people could possibly create such structure?

   Marker’s discretion for valid answers - e.g. system of levers and other engineering skills, + labour intensive

   (4 marks)

4. Describe a plausible reason for the disappearance of this community

   Marker’s discretion for valid answers but resource exhaustion such as water supply, soil loss, climate change, invasion by hostile neighbours, disease

   (2 marks)
The Giza Necropolis is an archaeological site on the Giza Plateau. Here is a photograph from a balloon gives a different perspective of the complex, and an appreciation of the massive undertaking by the people of that time. As with the Nazca Lines, many stories revolve around the mystery of their construction. This complex of ancient monuments includes the three pyramid complexes known as the Great Pyramids, the Great Sphinx, several cemeteries, a workers' village and an industrial complex. It is located some 9 km inland into the desert from the old town of Giza on the Nile, some 25 km southwest of Cairo city center. The pyramids, were popularized in Hellenistic times, when the Great Pyramid was listed by Antipater of Sidon as one of the Seven Wonders of the World. It is by far the oldest of the ancient Wonders and the only one still in existence. On this map, clearly mark where they are found;

**TASK 3:**

3 a) Create an annotated line drawing of the above photo in the box below; *(6 marks)*
### Question:

3 b) On this table, name the modern day country where these mysterious and magnificent structures stood;

<table>
<thead>
<tr>
<th>Name</th>
<th>Date of construction</th>
<th>Date of destruction</th>
<th>Cause of destruction</th>
<th>Modern day location (country)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great Pyramid of Giza</td>
<td>2584–2561 BC</td>
<td>Still in existence, majority of facade gone</td>
<td>Egypt</td>
<td></td>
</tr>
<tr>
<td>Hanging Gardens of Babylon</td>
<td>c. 600 BC (evident)</td>
<td>After 1st century AD</td>
<td>Earthquakes</td>
<td>Babylon Iraq or Iraq</td>
</tr>
<tr>
<td>Temple of Artemis at Ephesus</td>
<td>c. 550 BC; and again at 323 BC</td>
<td>356 BC (by Herostratus) AD 262 (by the Goths)</td>
<td>Arson by Herostratus, plundering</td>
<td>Izmir Province, Turkey</td>
</tr>
<tr>
<td>Statue of Zeus at Olympia</td>
<td>466–456 BC (Temple)</td>
<td>5th–6th centuries AD</td>
<td>Disassembled; later destroyed by fire</td>
<td>Olympia, Greece</td>
</tr>
<tr>
<td>Mausoleum at Halicarnassus</td>
<td>351 BC</td>
<td>12th-15th century AD</td>
<td>Earthquakes</td>
<td>Bodrum, Turkey</td>
</tr>
<tr>
<td>Colossus of Rhodes</td>
<td>292–280 BC</td>
<td>226 BC</td>
<td>226 BC Rhodes earthquake</td>
<td>Rhodes, Greece</td>
</tr>
<tr>
<td>Lighthouse of Alexandria</td>
<td>c. 280 BC</td>
<td>AD 1303–1480</td>
<td>1303 Crete earthquake</td>
<td>Alexandria, Egypt</td>
</tr>
</tbody>
</table>

(7 marks)
3 c) Now using a number key below label the countries you identified when completing Task 3a) onto the map below (4 marks)

MAP KEY:
1. IRAQ
2. EGYPT
3. TURKEY
4. GREECE
**TASK 4:**

**20,000 Leagues Under the Sea** (Jules Verne, 1870) – the **Voyage of the Nautilus**.

*Twenty Thousand Leagues Under the Sea* is a famous science fiction novel by, arguably the father of science fiction, the French author, Jules Verne in 1870. As the story begins, ships of several nations spot a mysterious sea monster, a creature which was sinking and damaging ocean vessels all over the world seas. The United States government finally assembles an expedition in New York City to track down and destroy the monster. Professor M. Aronnax, a French marine biologist and narrator of the story, who happens to be in New York at the time, receives a last-minute invitation to join the expedition which he accepts. Canadian master harpoonist Ned Land and Aronnax's faithful servant Conseil are also brought aboard.

The group all boarded ‘*The Abraham Lincoln*’, a whaler which departed Brooklyn, sailing around the South American continent, past the treacherous Cape Horn, into the Pacific and followed the migratory paths of the whales; this finally lead them to the north eastern Pacific area, off the coast of Japan. Here, the Abraham Lincoln was sunk by the mysterious object, which was later discovered to be the fabled Captain Nemo’s secret vessel, the Nautilus.

**Your task** is to track the progress of the Nautilus from the coordinates that have been listed here, communications from Professor Aronnax Mark, CLEARLY AND NEATLY, the DIRECT path on your world chart (map, chart is the correct nautical term for a map of the seas) from each coordinate, as the Nautilus would have to travel – points will be allocated for a neat clear path drawn on your chart. You will also need to answer the questions that may be linked to each coordinate. Good luck! *(5 marks)*
Route of the Nautilus from given coordinates

<table>
<thead>
<tr>
<th>COORDINATES</th>
<th>(10 marks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) 31°13' N. 133°16' E.</td>
<td>What is the body of water where the Abraham Lincoln was sunk Sea of Japan</td>
</tr>
<tr>
<td>2) 20°30' N. 157°42' W.</td>
<td>The name of the islands which the Nautilus passed at these coordinates? Hawaii</td>
</tr>
<tr>
<td>3) 34°57' S. 150°30' W.</td>
<td>Mysterious Island (a.k.a. Vulcania Island re: Disney 1954 version) Fictional Island in a number of Verne’s novels.</td>
</tr>
<tr>
<td>4) 11°40' S. 166°52' E.</td>
<td>The name of the island group which the Nautilus passed at these coordinates? Solomon Islands (Vanikoro)</td>
</tr>
<tr>
<td>5) 12°11' S. 96°53' E.</td>
<td>The name of the islands which the Nautilus passed at these coordinates? Cocos Islands</td>
</tr>
<tr>
<td>6) 5°53' N. 80°10' E.</td>
<td>The name of the country which the Nautilus passed at these coordinates? Sri Lanka</td>
</tr>
<tr>
<td>7) 21°31' N. 62° 0' E.</td>
<td>What is the name of the body of water that the Nautilus passes through at these coordinates? Arabian Sea</td>
</tr>
<tr>
<td>8) 11°49' N. 45°38' E.</td>
<td>What is the name of the body of water that the Nautilus passes through at these coordinates? Gulf of Aden</td>
</tr>
<tr>
<td>9) 35°29' N. 27°22' E.</td>
<td>What is the name of the large body of water (sea) that the Nautilus passes through at these coordinates? Mediterranean Sea (Island of Karpathos)</td>
</tr>
<tr>
<td>10) 35°N. 2° 0'E.</td>
<td>What is the name of the rock guarding the entry to a famous sea at these coordinates? Rock of Gibraltar</td>
</tr>
</tbody>
</table>

By the way;
How far is 20,000 leagues? …. (Worth 2 marks)

As used in Jules Verne's 'Twenty Thousand Leagues Under the Sea', a league is four kilometre's. The French ‘lieue’ – at different times – existed in several variants: 10,000, 12,000, 13,200 and 14,400 French feet, about 3.25 km to about 4.68 km. It was used along with the metric system for a while but is now long discontinued. Present day; 1 league = 5.55600 kilometres 20,000 leagues = ????

Answer = 20,000 leagues = 111,120 kilometres
NSW da Vinci Decathlon

An academic gala day for years 7 and 8

Creative Producers

Sessions 1 & 2

‘The deeper the feeling, the greater the pain’ Leonardo da Vinci.

Team Number _______________
Creative Producers

Background Information

Alfred Noyes in 1906 wrote the intriguing ballad ‘The Highwayman’. The ballad tells the story of a man who was pursued by the law and risked being captured when he rode to the house of the woman he loved. The fast paced rhythm and evocative imagery convey mystery and the tragic mayhem.

And still of a winter’s night, they say, when the wind is in the trees,  
When the moon is a ghostly galleon tossed upon cloudy seas,  
When the road is a ribbon of moonlight over the purple moor,  
A highwayman comes riding—  
Riding—riding—  
A highwayman comes riding, up to the old inn-door.

Task: 60 second Dramatic Performance

The team’s challenge is to create a 60-second dramatic performance that is inspired by the above verse from the ballad. The performance can be in any genre. It could be a dramatic monologue, an action adventure skit…it is up to the team to decide. Each group will have ten minutes to prepare for the presentation.

Marking Criteria

You will be marked on the basis of the following criteria:

- Physicality and voice /10
- Coherence – structure /10
- Dramatic communication of ideas /10
- Flair /10
- Content and use of the verse /10

A warning will be given at 55 seconds and the presentation will be stopped at 60 seconds.

Marking Grid

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Skillful 9-10</th>
<th>Effective 8-7</th>
<th>Sound 6-4</th>
<th>Limited 3-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physicality and voice</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coherence – structure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dramatic communication of ideas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flair</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Content and use of the verse</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTAL /50
NSW da Vinci
Decathlon

An academic gala day
for years 7 and 8

Mathematics Challenge
Session 2

‘Among all the studies of natural causes and reasons Light chiefly delights the beholder; and among the
great features of Mathematics the certainty of its demonstrations is what preeminently
(tends to) elevate the mind of the investigator’ Leonardo da Vinci.

Team Number ______________
MATHEMATICS OF MYSTERY AND MAYHEM

The ABD al-Samad Complex in Natanz Iran AD 1304

Please show all working as marks will be awarded for thinking!
You can use a calculator where necessary.
Question 1  Triangle Trickster  2 marks

For the following diagram:

What number should replace the question mark in the third triangle?  2
Question 2  Fractional Foolishness 3 marks

The diagram below shows the Eye of Horus which is on one of the tombs in Egypt.
The parts of this diagram represent fractions as shown. Interestingly the sum total of fractions does not equal 1.

(a) What do these factions add up to?

(b) By how much does the sum of these fractions differ from 1?
Question 3  Tally mania 4 marks

Different countries of the world have different tally systems to enable them to count.

In our country we use:

In South America they use:

In China Japan and Korea they use:

(a) You are in Japan and ordering sushi pieces and your Japanese waitress takes your order of 38 pieces. Write down the Japanese Tally for this amount in the space provided.

(b) You are in Buenos Aires and you tell a waitress you want 27 pieces of fish for a large birthday party. Write this as a tally using the South American notation in the space provided.
Pythagoras liked to play with pebbles. He arranged them in squares as shown in the diagram below:

From the diagram it can be seen that the first partial sum = 1, the second partial sum = 3, the third partial sum = 5…
Imagine that we extend this process of dividing up the square arrangements of pebbles into $n$ partial sums.

(a) Write down a generalised expression for an odd number in terms of $n$.  

(b) Write down the generalised expression for the sum of all the $n$ partial sums of all pebbles.

Use parts (a) and (b) above to answer part (c).

(c) Write down a series that expresses the sum if $n$ partial sums were taken.  

This will be of the form below.

$$1 + 3 + 5 + \ldots + (\text{an odd number in terms of } n) = (\text{an expression for the sum of } n \text{ partial sums of all pebbles})$$
Question 5 Islamic Geometric Patterns 4 marks

Your aim here is to construct the basic core of this pattern as shown in the following diagrams.

1. In pencil draw a hexagon in a circle with six intersecting lines (> 13–15).
   CD: BASIC TEMPLATES (3 & 4)

2. Draw a triangle within the hexagon using the marked intersections as guides. The triangle fits into the hexagon perfectly but is smaller than the circle.
3. Draw another triangle, as shown.

4. Draw another two triangles, as highlighted in bold. They are larger than the two triangles in steps 2 and 3.

5. Ink over the bold red lines in pen.

6. Repeat the shape in step 5 a further five times.
Now it is your turn to reproduce the pattern above using the steps as shown with your geometrical instruments.
Question 6 Fractional equations 3 marks

Solve \( \left( \frac{2}{3} + \frac{1}{10} \right) x = 10 \)
Question 7 Egyptian Unit Fractions 2 marks

A unit fraction is a fraction which has the number 1 in the numerator. Like \( \frac{1}{\text{number}} \)

Egyptian arithmetic made quite a lot of fuss about unit fractions. Each fraction was described as a sum of unit fractions.

It was sometimes possible to have more than one sum of unit fractions to express a particular fraction.

Given that \( \frac{5}{7} = \frac{1}{3} + \frac{1}{4} + \frac{1}{8} + \frac{1}{168} \)

Complete the missing values for the denominators to find another combination of unit fractions that add together to give \( \frac{5}{7} \):

\[
\frac{5}{7} = \frac{1}{\square} + \frac{1}{\square} + \frac{1}{14}
\]
Question 8  Scary Sixes     4 marks

The number 666 is the “number of the beast” in the biblical book of revelation. It has some unexpected properties.

Write these statements as number sentences.

(a) 666 is the sum of squares of the first 7 prime numbers.  
(Note: 1 is not a prime number.)

   $666 = \ldots\ldots\ldots\ldots\ldots$  

(b) 666 is the sum of the palindromic cubes of the first 6 integers.

   $666 = \ldots\ldots\ldots\ldots\ldots$

Note. 1. A palindromic number is like 1234321.

2. Incidentally the sixth of the palindromic cubes is $6^3 = 6 \times 6 \times 6$. (666)
Question 9 Friendly Numbers 3 marks

Two numbers are said to be friendly if the sum of the divisors of one number equals the other number and vice versa.

Show that 220 and 284 are friendly. (Include all working)
Question 10 Pinball Mathematics (Pick’s Theorem) 3 marks

Pick’s Theorem enables a method for computing the area enclosed by a many sided (polygonal) shape formed by joining up points whose coordinates are whole numbers and that the boundary of the polygon shape does not cross itself.

Area = Half the number of points on the boundary (b) + the number of points within the boundary (c) less one.

\[ A = \frac{1}{2} (b + c - 1) \]

Calculate the area of the polygonal shape given below:
Question 11 Oddness Overcome  2 marks

For the pentagons below:

Which pentagon shape is the odd one out?  

2
Question 12 Circle Craziness  2 marks

What would be the radius of a circle need to be if the perimeter of that circle was to be numerically equal to its area. Give your answer in centimetres.
Question 13 Magic Square Soliloquy 12 marks

Albrecht Durer’s 4x4 magic square, shown below, is really quite amazing.

(a) Durer constructed this square in the year AD \( [C(2)R(4),C(3)R(4)] \)
What year was that?  

(b) Find the sum of

\[
\begin{align*}
R(1) & = \\
R(2) & = \\
R(3) & = \\
R(4) & = \\
\end{align*}
\]

(c) Find the sum of the squares of the first two rows \( R(1) \) and \( R(2) \).
(d) Find the sum of the squares of the next two rows R (3) and R (4).

(e) Find the sum of the squares of rows R(1) and R(3).

Antonio Gaudi, the famous Spanish Architect who designed many buildings in Spain including the Sagrada Familia Roman Catholic cathedral in Barcelona, chose to modify Durer’s magic square as follows.

Taking Durer’s square he rotated it 180 degrees then subtracted 1 only from each of the squares containing 11,12,15,16. So taken was Gaudi that he carved in stone this new magic square and placed it in the entry foyer of the Catholic Cathedral.

This is what the new magic square looks like

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>14</th>
<th>14</th>
<th>4</th>
<th>Row(1)=R(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>7</td>
<td>6</td>
<td>9</td>
<td></td>
<td>Row(2)=R(2)</td>
</tr>
<tr>
<td>8</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td></td>
<td>Row(3)=R(3)</td>
</tr>
<tr>
<td>13</td>
<td>2</td>
<td>3</td>
<td>15</td>
<td></td>
<td>Row(4)=R(4)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>C(1)</td>
<td>C(2)</td>
<td>C(3)</td>
<td>C(4)</td>
</tr>
</tbody>
</table>
(f) Evaluate the sum of all the numbers in Row(1) and then R(2)

(g) Evaluate the sum of all the numbers in Column(1) and then Column (2)

(h) Evaluate the sum of each diagonals separately =

(i) What do you notice about parts f, g, and h above?

Comment on the significance of these answers, particularly in the light that this magic square is placed inside a CHRISTIAN cathedral.
Chess Puzzles Da Vinci 2014

1. White to play and checkmate black in two moves

Solution:

2. White to play and checkmate black in two moves

Solution:
3. White to play and checkmate black in two moves

Solution:

![Chessboard diagram](image1)

4. White to play and checkmate in 2 moves

Solution:

![Chessboard diagram](image2)
Among all the studies of natural causes and reasons Light chiefly delights the beholder; and among the
great features of Mathematics the certainty of its demonstrations is what preeminently
(tends to) elevate the mind of the investigator’ Leonardo da Vinci.

Team Number

________________
MATHEMATICS OF MYSTERY AND MAYHEM

The ABD al-Samad Complex in Natanz Iran AD 1304

Please show all working as marks will be awarded for thinking!
You can use a calculator where necessary.
Question 1  Triangle Trickster  2 marks

For the following diagram:

What number should replace the question mark in the third triangle?

Number is 15.  (Top multiplied by left) + right = middle number.

$(7\times8)+15 = 71$
Question 2  Fractional Foolishness 3 marks

The diagram below shows the Eye of Horus which is on one of the tombs in Egypt.
The parts of this diagram represent fractions as shown. Interestingly the sum total of fractions does not equal 1.

(a) What do these fractions add up to?

\[
\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \frac{1}{32} + \frac{1}{64} = \frac{63}{64}
\]

Part answer earns 1 mark

(b) By how much does the sum of these fractions differ from 1?

\[
1 - \frac{63}{64} = \frac{1}{64}
\]
Question 3  Tally mania 4 marks

Different countries of the world have different tally systems to enable them to count.

In our country we use:

![Japanese Tally System](image1)

In South America they use:

![South American Tally System](image2)

In China Japan and Korea they use:

![Chinese Tally System](image3)

(a) You are in Japan and ordering sushi pieces and your Japanese waitress takes your order of 38 pieces.

Write down the Japanese Tally for this amount in the space provided.

![Japanese Tally for 38 pieces](image4)

(b) You are in Buenos Aires and you tell a waitress you want 27 pieces of fish for a large birthday party.

Write this as a tally using the South American notation in the space provided.

![South American Tally for 27 pieces](image5)
Pythagoras liked to play with pebbles. He arranged them in squares as shown in the diagram below:
From the diagram it can be seen that the
first partial sum = 1, the second partial sum = 3, the third partial sum = 5…

Imagine that we extend this process of dividing up the square arrangements of pebbles into \( n \) partial sums.

(a) Write down a generalized expression for an odd number in terms of \( n \).

\[
(2n - 1)
\]

(b) Write down the generalized expression for the sum of all the \( n \) partial sums of all pebbles.

\[
n^2
\]

Use parts (a) and (b) above to answer part (c).

(c) Write down a series that expresses the sum if \( n \) partial sums were taken.

This will be of the form below.

\[
1 + 3 + 5 + \ldots + (\text{an odd number in terms of } n) = (\text{an expression for the sum of } n \text{ partial sums of all pebbles})
\]

\[
1 + 3 + 5 + \ldots + (2n - 1) = n^2
\]
**Question 5 Islamic Geometric Patterns 4 marks**

Your aim here is to construct the basic core of this pattern as shown in the following diagrams.

1. In pencil draw a hexagon in a circle with six intersecting lines (>13–15).
   
   CD: BASIC TEMPLATES (3 & 4)

2. Draw a triangle within the hexagon using the marked intersections as guides. The triangle fits into the hexagon perfectly but is smaller than the circle.
3. Draw another triangle, as shown.

4. Draw another two triangles, as highlighted in bold. They are larger than the two triangles in steps 2 and 3.

5. Ink over the bold red lines in pen.

6. Repeat the shape in step 5 a further five times.
Now it’s your turn to reproduce the pattern above using the steps as shown with your geometrical instruments.
Question 6 Fractional equations 3 marks

Solve \( \left( \frac{2}{3} + \frac{1}{10} \right) x = 10 \)

\[
\left( \frac{2}{3} + \frac{1}{10} \right) x = 10 \\
\left( \frac{20 + 3}{30} \right) x = 10 \\
\left( \frac{23}{30} \right) x = 10 \\
\therefore x = 10 \times \frac{30}{23} \\
\therefore x = \frac{300}{23} = 13.04(2dp)
\]

1 mark for line 2, 1 mark for line 4 and 1 mark for last line.
Question 7 Egyptian Unit Fractions 2 marks

A unit fraction is a fraction which has the number 1 in the numerator. Like \( \frac{1}{\text{number}} \)

Egyptian arithmetic made quite a lot of fuss about unit fractions. Each fraction was described as a sum of unit fractions.

It was sometimes possible to have more than one sum of unit fractions to express a particular fraction.

Given that \( \frac{5}{7} = \frac{1}{3} + \frac{1}{4} + \frac{1}{8} + \frac{1}{168} \)

Complete the missing values for the denominators to find another combination of unit fractions that add together to give \( \frac{5}{7} \):

\[
\begin{align*}
\frac{5}{7} & = \frac{1}{\square} + \frac{1}{\square} + \frac{1}{14} \\
\frac{5}{7} & = \frac{1}{2} + \frac{1}{7} + \frac{1}{14}
\end{align*}
\]

One mark for each fraction obtained
Question 8 Scary Sixes     4 marks

The number 666 is the “number of the beast” in the biblical book of revelation. It has some unexpected properties.

Write these statements as number sentences.

(a) 666 is the sum of squares of the first 7 prime numbers

\[ 2^2 + 3^2 + 5^2 + 7^2 + 11^2 + 13^2 + 17^2 = 666 \]

(b) 666 is the sum of the palindromic cubes of the first 6 integers.

\[ 666 = (1)^3 + (2)^3 + (3)^3 + (4)^3 + (5)^3 + (6)^3 + (5)^3 + (4)^3 + (3)^3 + (2)^3 + (1)^3 \]

Note.  
1. A palindromic number is like 1234321.
2. Incidentally the sixth of the palindromic cubes is \( 6^3 = 6 \times 6 \times 6 \). (666)
Question 9 Friendly Numbers 3 marks

Two numbers are said to be friendly if the sum of the divisors of one number equals the other number and vice versa.

Show that 220 and 284 are friendly.
(Include all working).

Sum of divisors of 220 = 1+2+4+5+10+11+20+22+44+55+110+220 = 504 2 marks

Similarly the sum of the divisors of 284 = 1 + 2 + 4 + 71 + 142 + 284 = 504

An explanation = 1 mark
Question 10 Pinball Mathematics (Pick’s Theorem) 3 marks

Pick’s Theorem enables a method for computing the area enclosed by a many sided (polygonal) shape formed by joining up points whose coordinates are whole numbers and that the boundary of the polygon shape does not cross itself.

Area = Half the number of points on the boundary \((b)\) + the number of points within the boundary \((c)\) less one.
\[
A = \frac{1}{2} (b) + c - 1.
\]

Calculate the area of the polygonal shape given below:

The number of points on the boundary \(= b = 22\) and the number of interior points \(c = 7\)

Hence the area
\[
A = \frac{b}{2} + c - 1
\]
\[
A = \frac{22}{2} + 7 - 1
\]
\[
A = 17
\]

Area is 17 square units.

1 mark for \(b\) correct, 1 mark for \(c\) correct, 1 mark for correct answer.
Question 11 Oddness Overcome  2 marks

For the pentagons below:

Which pentagon shape is the odd one out?

Answer = D. The others have identical pairs: A and B, and C and E
Question 12 Circle Craziness  2 marks

The perimeter of a particular circle is numerically equal to the area of the same circle.

What would the radius of such a circle need to be? 2.

(Give your answer in centimetres).

\[ 2\pi r = \pi r^2 \]
\[ 2r = r^2 \]
\[ r = 2, r > 0 \]

The required radius = 2 cm 1
Question 13 Magic Square Soliloquy  15 marks

Albrecht Durer’s 4x4 magic square, shown below, is really quite amazing.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th>13</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>3</td>
<td>2</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>11</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>6</td>
<td>7</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>15</td>
<td>14</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Row(1)=R(1)
Row(2)=R(2)
Row(3)=R(3)
Row(4)=R(4)

(a) Durer constructed this square in the year AD \([C(2)R(4),C(3)R(4)]\)
What year was that?  
AD 1514

(b) Find the sum of

R(1) = 34

R(2)= 34

R(3)= 34

R(4)= 34
(c) Find the sum of the squares of the first two rows \( R(1) + R(2) \). \( = 748 \)

(d) Find the sum of the squares of the next two rows \( R(3) \) and \( R(4) \). \( = 748 \)

(e) Find the sum of the squares of rows \( R(1) \) and \( R(3) \). \( = 748 \)

**Antonio Gaudi**, the famous Spanish Architect who designed many buildings in Spain including the **Sagrada Familia Roman Catholic Cathedral in Barcelona**, chose to modify Durer’s magic square as follows.

Taking Durer’s square he rotated it 180 degrees then subtracted 1 only from each of the squares containing 11, 12, 15, 16. So taken was Gaudi that he carved in stone this new magic square and placed it in the entry foyer of the Catholic Cathedral.

This is what the new magic square looks like

<table>
<thead>
<tr>
<th>1</th>
<th>14</th>
<th>14</th>
<th>4</th>
<th>( \text{Row}(1) = R(1) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>7</td>
<td>6</td>
<td>9</td>
<td>( \text{Row}(2) = R(2) )</td>
</tr>
<tr>
<td>8</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>( \text{Row}(3) = R(3) )</td>
</tr>
<tr>
<td>13</td>
<td>2</td>
<td>3</td>
<td>15</td>
<td>( \text{Row}(4) = R(4) )</td>
</tr>
<tr>
<td><strong>Column 1</strong></td>
<td><strong>Column 2</strong></td>
<td><strong>Column 3</strong></td>
<td><strong>Column 4</strong></td>
<td></td>
</tr>
<tr>
<td>C(1)</td>
<td>C(2)</td>
<td>C(3)</td>
<td>C(4)</td>
<td></td>
</tr>
</tbody>
</table>
(f) Evaluate the sum of all the numbers in Row(1) and then Row(2) 33 and 33

(g) Evaluate the sum of all the numbers in Column(1) and then Column (2)
   33 and 33

(h) Evaluate the sum of each diagonals separately =
   = 33 and 33 each time

(i) What do you notice about parts f, g, and h above?
   All rows and columns add up to 33 individually!!

Comment on the significance of these answers, particularly in the light that this magic square is placed inside a CHRISTIAN cathedral.

This was the age of Christ Jesus at his death. Gaudi wanted to venerate his life and death.
Chess Puzzles Da Vinci 2014 Solutions

1. White to play and checkmate black in two moves

Solution: 1.Bf2 Kd2 2.Qd4#

2. White to play and checkmate black in two moves

Solution: 1.Nf4 Kc1 2.Nge2#
3. White to play and checkmate black in two moves

Solution: 1.f8R Kxe7 2.Qd6#

4. White to play and checkmate in 2 moves

Solution: 1.Qe1+ Kg4 [1...Rg3 2.Qxg3#] 2.Qe4#
NSW da Vinci Decathlon

An academic gala day for Years 7 & 8

English Challenge

Session 1

‘The noblest pleasure is the joy of understanding’ Leonardo da Vinci.

Team Number  ________________
Activity One: Spelling (10 marks)

Ten words will be read out to you. Please write your answers on the spelling sheet provided.

Activity Two: Famous novel match-up (10 marks)

Match the novel title with the character or the villain.

<table>
<thead>
<tr>
<th>Novels</th>
<th>Characters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great Expectations</td>
<td></td>
</tr>
<tr>
<td>The Hound of the Baskervilles</td>
<td></td>
</tr>
<tr>
<td>Hunger Games</td>
<td></td>
</tr>
<tr>
<td>The Adventures of Huckleberry Finn</td>
<td></td>
</tr>
<tr>
<td>Lord of the Flies</td>
<td></td>
</tr>
<tr>
<td>The Eyre Affair</td>
<td></td>
</tr>
<tr>
<td>Gulliver’s Travels</td>
<td></td>
</tr>
<tr>
<td>1984</td>
<td></td>
</tr>
<tr>
<td>The Hitchhiker’s Guide to the Galaxy</td>
<td></td>
</tr>
<tr>
<td>Ender’s Game</td>
<td></td>
</tr>
</tbody>
</table>

Film and Actor Match-Up:

1. Andrew Wiggin
2. Jim
3. Abel Magwitch
4. Simon
5. Primrose Everdeen
6. Acheron Hades
7. Winston Smith
8. Zaphod Beeblebrox
9. Sherlock Holmes
10. Glumdalclitch

Activity Three: Analysing an extract from The Tell-tale Heart by Edgar Allan Poe (15 marks)

Questions

TRUE! --nervous --very, very dreadfully nervous I had been and am; but why will you say that I am mad? The disease had sharpened my senses --not destroyed --not dulled them. Above all was the sense of hearing acute. I heard all things in the heaven and in the earth. I
heard many things in hell. How, then, am I mad? Hearken! and observe how healthily --how calmly I can tell you the whole story.

It is impossible to say how first the idea entered my brain; but once conceived, it haunted me day and night. Object there was none. Passion there was none. I loved the old man. He had never wronged me. He had never given me insult. For his gold I had no desire. I think it was his eye! yes, it was this! He had the eye of a vulture --a pale blue eye, with a film over it. Whenever it fell upon me, my blood ran cold; and so by degrees --very gradually --I made up my mind to take the life of the old man, and thus rid myself of the eye forever.

Now this is the point. You fancy me mad. Madmen know nothing. But you should have seen me. You should have seen how wisely I proceeded --with what caution --with what foresight - -with what dissimulation I went to work! I was never kinder to the old man than during the whole week before I killed him. And every night, about midnight, I turned the latch of his door and opened it --oh so gently! And then, when I had made an opening sufficient for my head, I put in a dark lantern, all closed, closed, that no light shone out, and then I thrust in my head. Oh, you would have laughed to see how cunningly I thrust it in! I moved it slowly --very, very slowly, so that I might not disturb the old man's sleep. It took me an hour to place my whole head within the opening so far that I could see him as he lay upon his bed. Ha! would a madman have been so wise as this, And then, when my head was well in the room, I undid the lantern cautiously-oh, so cautiously --cautiously (for the hinges creaked) --I undid it just so much that a single thin ray fell upon the vulture eye. And this I did for seven long nights --every night just at midnight --but I found the eye always closed; and so it was impossible to do the work; for it was not the old man who vexed me, but his Evil Eye. And every morning, when the day broke, I went boldly into the chamber, and spoke courageously to him, calling him by name in a hearty tone, and inquiring how he has passed the night. So you see he would have been a very profound old man, indeed, to suspect that every night, just at twelve, I looked in upon him while he slept.

Upon the eighth night I was more than usually cautious in opening the door. A watch's minute hand moves more quickly than did mine. Never before that night had I felt the extent of my own powers --of my sagacity. I could scarcely contain my feelings of triumph. To think that there I was, opening the door, little by little, and he not even to dream of my secret deeds or thoughts. I fairly chuckled at the idea; and perhaps he heard me; for he moved on the bed suddenly, as if startled. Now you may think that I drew back --but no. His room was as black as pitch with the thick darkness, (for the shutters were close fastened, through fear of robbers,) and so I knew that he could not see the opening of the door, and I kept pushing it on steadily, steadily.

1. What personal pronoun is used to connect to the audience and why? (2 marks)

2. How does Poe build the suspense? Identify two ways that he does this. (2 marks)
3. Find examples of the following techniques: (5 marks)
   a. Rhetorical question: .................................................................
   b. Alliteration: ............................................................................
   c. Metaphor: ................................................................................
   d. Disjunction: .................................................................
   e. Simile: .....................................................................................

4. How does the persona try to convince himself that what he is doing is acceptable and that he is not mad? (1 mark)

5. Write the paragraph that would follow after he opened the door. You will be awarded marks for the following: (5 Marks)
   a. Mimicking Poe’s style.
   b. Maintaining the suspense.
   c. An original an unusual ending.
   d. Including onomatopoeia and personification.
Activity Four: Analysing an extract from Shakespeare’s *Midsummer Night’s Dream* (10 marks)

The poet’s eye, in a fine frenzy rolling,
Doth glance from heaven to earth, from earth to heaven;
And as imagination bodies forth
The forms of things unknown, the poet’s pen
Turns them to shapes, and gives to airy nothing
A local habitation and a name.
Such tricks hath strong imagination
That, if it would but apprehend some joy,
It comprehends some bringer of that joy;
Or in the night, imagining some fear,
How easy is a bush supposed a bear!

Questions:

1. What is the pen able to do? (1 mark)

2. Find examples of the following figurative devices: (2 marks)
   a. Sibilants:  
   b. Enjambment:

3. What is the message of the extract? Provide an example to support your answer. (2 marks)
4. Add five more lines that complete this extract. You must match Shakespeare’s style!
(5 marks)

Marking Grid – (5 marks)

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 lines</td>
<td>0</td>
</tr>
<tr>
<td>Iambic pentameter (5 stressed and 5 unstressed beats)</td>
<td>0</td>
</tr>
<tr>
<td>Matches Shakespeare’s style and continues theme re the poet inspiring the imagination</td>
<td>1 2 3</td>
</tr>
</tbody>
</table>

TOTAL /5

Activity 5: 50-word narrative - The mystery of the missing letter ‘e’
(10 marks)

Compose a **50-word narrative** that uncovers the mystery of the missing letter ‘e’ and that includes the following ingredients:

a. No letter ‘e’ – it has been stolen!
b. Abstract noun
c. A simile
d. A detective
**Marking Grid – (10 marks)**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-words exactly</td>
<td>0 1</td>
</tr>
<tr>
<td>No letter ‘e’</td>
<td>0 1</td>
</tr>
<tr>
<td>Simile</td>
<td>0 1</td>
</tr>
<tr>
<td>A detective</td>
<td>0 1</td>
</tr>
<tr>
<td>Abstract noun</td>
<td>0 1</td>
</tr>
<tr>
<td>Clever and original story about the missing letter ‘e’</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

**TOTAL /10**

Title:……………………………………..
Activity 6: Analysing an Image – *Ender’s Game* movie poster (6 marks)

Identify three visual techniques that convey mystery and mayhem in the poster. You must refer explicitly to a visual technique.

<table>
<thead>
<tr>
<th>Visual Techniques</th>
<th>How they convey mystery and mayhem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
NSW da Vinci Decathlon

An academic gala day for Years 7 & 8

English Challenge Answers

Session 1

‘The noblest pleasure is the joy of understanding’ Leonardo da Vinci.

Team Number ______________
Activity One: Spelling (10 marks)

Ten words will be read out to you. Please write your answers on the spelling sheet provided.

Activity Two: Famous novel match-up (10 marks)

Match the novel title with the character or the villain.

<table>
<thead>
<tr>
<th>Novels</th>
<th>Characters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great Expectations</td>
<td>Abel Magwitch</td>
</tr>
<tr>
<td>The Hound of the Baskervilles</td>
<td>Sherlock Holmes</td>
</tr>
<tr>
<td>Hunger Games</td>
<td>Primrose Everdeen</td>
</tr>
<tr>
<td>The Adventures of Huckleberry Finn</td>
<td>Jim</td>
</tr>
<tr>
<td>Lord of the Flies</td>
<td>Simon</td>
</tr>
<tr>
<td>The Eyre Affair</td>
<td>Acheron Hades</td>
</tr>
<tr>
<td>Gulliver’s Travels</td>
<td>Glumdalclitch</td>
</tr>
<tr>
<td>1984</td>
<td>Winston Smith</td>
</tr>
<tr>
<td>The Hitchhiker’s Guide to the Galaxy</td>
<td>Zaphod Beeblebrox</td>
</tr>
<tr>
<td>Ender’s Game</td>
<td>Andrew Wiggin</td>
</tr>
</tbody>
</table>

Novel and Character Match-Up:

1. Andrew Wiggin
2. Jim
3. Abel Magwitch
4. Simon
5. Primrose Everdeen
6. Acheron Hades
7. Winston Smith
8. Zaphod Beeblebrox
9. Sherlock Holmes
10. Glumdalclitch

Activity Three: Analysing an extract from The Tell-tale Heart by Edgar Allan Poe (15 marks)

Questions

TRUE! --nervous --very, very dreadfully nervous I had been and am; but why will you say that I am mad? The disease had sharpened my senses --not destroyed --not dulled them. Above all was the sense of hearing acute. I heard all things in the heaven and in the earth. I
heard many things in hell. How, then, am I mad? Hearken! and observe how healthily --how calmly I can tell you the whole story.

It is impossible to say how first the idea entered my brain; but once conceived, it haunted me day and night. Object there was none. Passion there was none. I loved the old man. He had never wronged me. He had never given me insult. For his gold I had no desire. I think it was his eye! yes, it was this! He had the eye of a vulture --a pale blue eye, with a film over it. Whenever it fell upon me, my blood ran cold; and so by degrees --very gradually --I made up my mind to take the life of the old man, and thus rid myself of the eye forever.

Now this is the point. You fancy me mad. Madmen know nothing. But you should have seen me. You should have seen how wisely I proceeded --with what caution --with what foresight --with what dissimulation I went to work! I was never kinder to the old man than during the whole week before I killed him. And every night, about midnight, I turned the latch of his door and opened it --oh so gently! And then, when I had made an opening sufficient for my head, I put in a dark lantern, all closed, closed, that no light shone out, and then I thrust in my head. Oh, you would have laughed to see how cunningly I thrust it in! I moved it slowly --very, very slowly, so that I might not disturb the old man's sleep. It took me an hour to place my whole head within the opening so far that I could see him as he lay upon his bed. Ha! would a madman have been so wise as this, And then, when my head was well in the room, I undid the lantern cautiously-oh, so cautiously --cautiously (for the hinges creaked) --I undid it just so much that a single thin ray fell upon the vulture eye. And this I did for seven long nights --every night just at midnight --but I found the eye always closed; and so it was impossible to do the work; for it was not the old man who vexed me, but his Evil Eye. And every morning, when the day broke, I went boldly into the chamber, and spoke courageously to him, calling him by name in a hearty tone, and inquiring how he has passed the night. So you see he would have been a very profound old man, indeed, to suspect that every night, just at twelve, I looked in upon him while he slept.

Upon the eighth night I was more than usually cautious in opening the door. A watch's minute hand moves more quickly than did mine. Never before that night had I felt the extent of my own powers --of my sagacity. I could scarcely contain my feelings of triumph. To think that there I was, opening the door, little by little, and he not even to dream of my secret deeds or thoughts. I fairly chuckled at the idea; and perhaps he heard me; for he moved on the bed suddenly, as if startled. Now you may think that I drew back --but no. His room was as black as pitch with the thick darkness, (for the shutters were close fastened, through fear of robbers,) and so I knew that he could not see the opening of the door, and I kept pushing it on steadily, steadily.

---

1. What personal pronoun is used to connect to the audience and why? 
   ‘You’ second person. When he tries to persuade the reader that he is not mad, he is trying to convince himself. By Poe using the second person he is showing the man’s madness. (2 marks)

2. How does Poe build the suspense? Identify two ways that he does this. 
   Exclamation (!); repetition; short declarative sentences; describing his actions as they happen; adverbs ‘gently’, ‘steadily’… (2 marks)

3. Find examples of the following techniques: 
   (5 marks)
a. Rhetorical question: ‘How, then, am I mad?’
b. Alliteration: ‘broke, I went boldly’ (any repetition of the consonant at the beginning of 2 words or more)
c. Metaphor: ‘eye of a vulture’
d. Disjunction: ‘But…’
e. Simile: ‘His room was as black as pitch…’

4. How does the persona try to convince himself that what he is doing is acceptable and that he is not mad? (1 mark)
   By focusing on the eye and how it torments him. He describes the eye as being evil and like a vulture.

5. Write the paragraph that would follow after he opened the door. You will be awarded marks for the following: (5 Marks)
   a. Mimicking Poe’s style. (1st and 2nd person)
   b. Maintaining the suspense. (sentence length and word choice)
   c. An original an unusual ending.
   d. Including onomatopoeia and personification. (word echoes a sound; human qualities attributed to a non-human)

Activity Four: Analysing an extract from Shakespeare’s Midsummer Night’s Dream (10 marks)

The poet’s eye, in a fine frenzy rolling,
Doth glance from heaven to earth, from earth to heaven;
And as imagination bodies forth
The forms of things unknown, the poet’s pen
Turns them to shapes, and gives to airy nothing
A local habitation and a name.
Such tricks hath strong imagination
That, if it would but apprehend some joy,
It comprehends some bringer of that joy;
Or in the night, imagining some fear,
How easy is a bush supposed a bear!

Questions:
1. What is the pen able to do? (1 mark)
   Spark the reader’s imagination.

2. Find examples of the following figurative devices: (2 marks)
   a. Sibilants (‘s’ sound repeated)
   b. Enjambment (any run on line)

3. What is the message of the extract? Provide an example to support your answer.
How a writer can use words to spark our imaginations. Turning into shapes, bring joy or fear…

4. Add five more lines that complete this extract. You must match Shakespeare’s style!

Marking Grid – (5 marks)

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 lines</td>
<td>0 1</td>
</tr>
<tr>
<td>Iambic pentameter (5 stressed and 5 unstressed beats)</td>
<td>0 1</td>
</tr>
<tr>
<td>Matches Shakespeare’s style and continues theme re the poet inspiring the</td>
<td>1 2 3</td>
</tr>
<tr>
<td>imagination</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>/5</td>
</tr>
</tbody>
</table>

Activity 5: 50-word narrative - The mystery of the missing letter ‘e’

Compose a 50-word narrative that uncovers the mystery of the missing letter ‘e’ and that includes the following ingredients: (10 marks)

a. No letter ‘e’ – it has been stolen!

b. Abstract noun (an emotion or feeling, e.g. love, happiness…)

c. A simile (Like or as comparison)

d. A detective

Marking Grid – (10 marks)

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-words exactly</td>
<td>0 1</td>
</tr>
<tr>
<td>No letter ‘e’</td>
<td>0 1</td>
</tr>
<tr>
<td>Simile</td>
<td>0 1</td>
</tr>
<tr>
<td>A detective</td>
<td>0 1</td>
</tr>
<tr>
<td>Abstract noun</td>
<td>0 1</td>
</tr>
<tr>
<td>Clever and original story about the missing letter ‘e’</td>
<td>1 2 3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>/10</td>
</tr>
</tbody>
</table>

Title:……………………………………………. 
Activity 6: Analysing an Image – *Ender’s Game* movie poster (6 marks)

Identify three visual techniques that convey mystery and mayhem in the poster. You must refer explicitly to a visual technique.

<table>
<thead>
<tr>
<th>Visual Techniques</th>
<th>How they convey the idea mystery and mayhem</th>
</tr>
</thead>
</table>
| Framing           | • Ender alone at the centre of the frame surrounded by darkness and looking beyond the frame into the mysterious outer space.  
                     • The circular window in the centre of the frame lets us see out but what is out there is obscure. |
| Colour            | • Black symbolises mystery and the unknown. |
| Symbolism         | • The gun on Ender’s hip symbolises the threat of danger – mayhem.  
                     • The anonymous figure clad in a uniform symbolises a soldier, the unknown… |
NSW da Vinci
Decathlon

An Academic Gala Day
for Years 7 and 8

Philosophy

Session 1

‘All our knowledge has its origins in our perceptions’ Leonardo da Vinci.

Team Number ______________
Section 1: Knowledge and Understanding (10 marks - 1 per question)

Epistemology

Write TRUE or FALSE next to the following statements about branches of Epistemology:

- Evidentialism asserts the notion that what makes a belief justified is the possession of evidence.
- Reliabilism argues that a belief has a high probability of truth if the belief is embedded in reliable cognitive processes or faculties.
- Evidentialism is typically associated with externalism
- Evidentialists argue that evidence consists of perceptual introspective, memorial and intuitional experiences.
- Reliabilists argue that a belief is justified if, and only if, it results from cognitive origin that is reliable.
- Reliabilism is typically associated with internalism
- Reliabilists believe if the justification of one’s beliefs is determined by the reliability of one’s belief sources, justification will always be recognisable on reflection.
- Internalism with regard justification is the idea that everything necessary to provide justification for a belief must be immediately available to an agent's consciousness
- Externalists would argue that only external conditions can imply objective probability.

A motivational externalist thinks that moral judgments about the right thing to do not necessitate some motivation to do those things that are judged to be the right thing to do; rather, an independent desire—such as the desire to do the right thing—is required.
Section Two – Logic and Logical Fallacy

Identify the logical fallacy in each of these scenarios;

1) In examining a graph of rising sea levels around the world, Brian observes that the number of petrol tankers on the oceans has also increased in recent years. Brian deduces that the depth of these enormous boats is the cause of the rising sea levels, not global warming.
This is an example of:

a) Strawman
b) Personal incredulity
c) False cause

2) Garry claimed to have psychic powers. When these powers were tested under scientific conditions and he was unable to demonstrate any such skills, he claimed that they would only work on people who had faith in his gift.
This is an example of:

a) special pleading
b) appeal to nature
c) burden of proof

3) The ‘Natural Springs’ water company promoted their product as having health benefits above and beyond medicines because it is an entirely natural product from the springs of Tasmania.
This is an example of:

a) ambiguity
b) appeal to nature
c) middle ground
Section Three: Euler Diagrams

Match the explanation with the diagram

<table>
<thead>
<tr>
<th>Image A</th>
<th>Image B</th>
<th>Image C</th>
<th>Image D</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Image A" /></td>
<td><img src="image" alt="Image B" /></td>
<td><img src="image" alt="Image C" /></td>
<td><img src="image" alt="Image D" /></td>
</tr>
</tbody>
</table>

1) All A are B
2) Some A is in B
3) Some A is not in B
4) No A is B

Create a Euler diagram to assess the validity of argument in the following image;

![Image](image)
Valid and Invalid logical reasoning:

Detectives Smith and Jones are engaged in a discussion at a Crime Scene. They arrive at a number of valid and invalid conclusions throughout the course of their discussion. Determine whether their conclusions are valid or invalid and circle the correct answer.

Detective Smith: All home robberies of this kind in the past have been carried out using a crow-bar to get in the front door.

Detective Jones: Crow bars are the most effective way to break into a home.

Conclusion: The criminal who burgled this home used a crow bar as his means of entry.

VALID
INVALID

Detective Smith: On all the cases where we have worked together, we have solved the case within two weeks.

Detective Jones: When we work by ourselves, we take an average of four weeks to crack the case.

Conclusion: If the detectives work on the case together, they will solve it in half the time.

VALID
INVALID

Detective Smith: We have detected some clear fingerprints from the safe the criminal tried to remove from the home.

Detective Jones: Yes, they match the fingerprints from known criminal ‘Sticky Fingers’ Pete.

Conclusion: ‘Sticky Fingers’ Pete tried to steal the safe.

VALID
INVALID
Barack Obama’s Second Inaugural Speech

Published: January 21, 2013

The following is a transcript of President Obama’s second inaugural speech.

MR. OBAMA: Vice President Biden, Mr Chief Justice, Members of the United States Congress, distinguished guests, and fellow citizens:

Each time we gather to inaugurate a President, we bear witness to the enduring strength of our Constitution. We affirm the promise of our democracy. We recall that what binds this nation together is not the colors of our skin or the tenets of our faith or the origins of our names. What makes us exceptional – what makes us American – is our allegiance to an idea, articulated in a declaration made more than two centuries ago:

“We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable rights, that among these are Life, Liberty, and the pursuit of Happiness.”

Today we continue a never-ending journey, to bridge the meaning of those words with the realities of our time. For history tells us that while these truths may be self-evident, they have never been self-executing; that while freedom is a gift from God, it must be secured by His people here on Earth. The patriots of 1776 did not fight to replace the tyranny of a king with the privileges of a few or the rule of a mob. They gave to us a Republic, a government of, and by, and for the people, entrusting each generation to keep safe our founding creed.

For more than two hundred years, we have.

Through blood drawn by lash and blood drawn by sword, we learned that no union founded on the principles of liberty and equality could survive half-slave and half-free. We made ourselves anew, and vowed to move forward together.
Together, we determined that a modern economy requires railroads and highways to speed travel and commerce; schools and colleges to train our workers.

Together, we discovered that a free market only thrives when there are rules to ensure competition and fair play.

Together, we resolved that a great nation must care for the vulnerable, and protect its people from life’s worst hazards and misfortune.

Through it all, we have never relinquished our skepticism of central authority, nor have we succumbed to the fiction that all society’s ills can be cured through government alone. Our celebration of initiative and enterprise; our insistence on hard work and personal responsibility, these are constants in our character.

But we have always understood that when times change, so must we; that fidelity to our founding principles requires new responses to new challenges; that preserving our individual freedoms ultimately requires collective action. For the American people can no more meet the demands of today’s world by acting alone than American soldiers could have met the forces of fascism or communism with muskets and militias. No single person can train all the math and science teachers we’ll need to equip our children for the future, or build the roads and networks and research labs that will bring new jobs and businesses to our shores. Now, more than ever, we must do these things together, as one nation, and one people.

This generation of Americans has been tested by crises that steeled our resolve and proved our resilience. A decade of war is now ending. An economic recovery has begun. America’s possibilities are limitless, for we possess all the qualities that this world without boundaries demands: youth and drive; diversity and openness; an endless capacity for risk and a gift for reinvention. My fellow Americans, we are made for this moment, and we will seize it – so long as we seize it together.
For we, the people, understand that our country cannot succeed when a shrinking few do very well and a growing many barely make it. We believe that America’s prosperity must rest upon the broad shoulders of a rising middle class. We know that America thrives when every person can find independence and pride in their work; when the wages of honest labor liberate families from the brink of hardship. We are true to our creed when a little girl born into the bleakest poverty knows that she has the same chance to succeed as anybody else, because she is an American, she is free, and she is equal, not just in the eyes of God but also in our own.

We understand that outworn programs are inadequate to the needs of our time. We must harness new ideas and technology to remake our government, revamp our tax code, reform our schools, and empower our citizens with the skills they need to work harder, learn more, reach higher. But while the means will change, our purpose endures: a nation that rewards the effort and determination of every single American. That is what this moment requires. That is what will give real meaning to our creed.

We, the people, still believe that every citizen deserves a basic measure of security and dignity. We must make the hard choices to reduce the cost of health care and the size of our deficit. But we reject the belief that America must choose between caring for the generation that built this country and investing in the generation that will build its future. For we remember the lessons of our past, when twilight years were spent in poverty, and parents of a child with a disability had nowhere to turn. We do not believe that in this country, freedom is reserved for the lucky, or happiness for the few. We recognize that no matter how responsibly we live our lives, any one of us, at any time, may face a job loss, or a sudden illness, or a home swept away in a terrible storm. The commitments we make to each other – through Medicare, and Medicaid, and Social Security – these things do not sap our initiative; they strengthen us. They do not make us a nation of takers; they free us to take the risks that make this country great.
We, the people, still believe that our obligations as Americans are not just to ourselves, but to all posterity. We will respond to the threat of climate change, knowing that the failure to do so would betray our children and future generations. Some may still deny the overwhelming judgment of science, but none can avoid the devastating impact of raging fires, and crippling drought, and more powerful storms. The path towards sustainable energy sources will be long and sometimes difficult. But America cannot resist this transition; we must lead it. We cannot cede to other nations the technology that will power new jobs and new industries – we must claim its promise. That’s how we will maintain our economic vitality and our national treasure – our forests and waterways; our croplands and snowcapped peaks. That is how we will preserve our planet, commanded to our care by God. That’s what will lend meaning to the creed our fathers once declared.

We, the people, still believe that enduring security and lasting peace do not require perpetual war. Our brave men and women in uniform, tempered by the flames of battle, are unmatched in skill and courage. Our citizens, seared by the memory of those we have lost, know too well the price that is paid for liberty. The knowledge of their sacrifice will keep us forever vigilant against those who would do us harm. But we are also heirs to those who won the peace and not just the war, who turned sworn enemies into the surest of friends, and we must carry those lessons into this time as well.

We will defend our people and uphold our values through strength of arms and rule of law. We will show the courage to try and resolve our differences with other nations peacefully – not because we are naïve about the dangers we face, but because engagement can more durably lift suspicion and fear. America will remain the anchor of strong alliances in every corner of the globe; and we will renew those institutions that extend our capacity to manage crisis abroad, for no one has a greater stake in a peaceful world than its most powerful nation. We will support democracy from Asia to Africa; from the Americas to the Middle East, because our interests and our conscience compel us to act on behalf of those who long for freedom.
And we must be a source of hope to the poor, the sick, the marginalized, the victims of prejudice – not out of mere charity, but because peace in our time requires the constant advance of those principles that our common creed describes: tolerance and opportunity; human dignity and justice.

We, the people, declare today that the most evident of truths – that all of us are created equal – is the star that guides us still; just as it guided our forebears through Seneca Falls, and Selma, and Stonewall; just as it guided all those men and women, sung and unsung, who left footprints along this great Mall, to hear a preacher say that we cannot walk alone; to hear a King proclaim that our individual freedom is inextricably bound to the freedom of every soul on Earth.

It is now our generation’s task to carry on what those pioneers began. For our journey is not complete until our wives, our mothers, and daughters can earn a living equal to their efforts. Our journey is not complete until our gay brothers and sisters are treated like anyone else under the law – for if we are truly created equal, then surely the love we commit to one another must be equal as well. Our journey is not complete until no citizen is forced to wait for hours to exercise the right to vote. Our journey is not complete until we find a better way to welcome the striving, hopeful immigrants who still see America as a land of opportunity; until bright young students and engineers are enlisted in our workforce rather than expelled from our country. Our journey is not complete until all our children, from the streets of Detroit to the hills of Appalachia to the quiet lanes of Newtown, know that they are cared for, and cherished, and always safe from harm.

That is our generation’s task – to make these words, these rights, these values – of Life, and Liberty, and the Pursuit of Happiness – real for every American. Being true to our founding documents does not require us to agree on every contour of life; it does not mean we all define liberty in exactly the same way, or follow the same precise path to happiness. Progress does not compel us to settle centuries-long debates about the role of government for all time – but it does require us to act in our time.
For now decisions are upon us, and we cannot afford delay. We cannot mistake absolutism for principle, or substitute spectacle for politics, or treat name-calling as reasoned debate. We must act, we must act knowing that our work will be imperfect. We must act, knowing that today’s victories will be only partial, and that it will be up to those who stand here in four years, and forty years, and four hundred years hence to advance the timeless spirit once conferred to us in a spare Philadelphia hall.

My fellow Americans, the oath I have sworn before you today, like the one recited by others who serve in this Capitol, was an oath to God and country, not party or faction – and we must faithfully execute that pledge during the duration of our service. But the words I spoke today are not so different from the oath that is taken each time a soldier signs up for duty, or an immigrant realizes her dream. My oath is not so different from the pledge we all make to the flag that waves above and that fills our hearts with pride.

They are the words of citizens, and they represent our greatest hope.

You and I, as citizens, have the power to set this country’s course.

You and I, as citizens, have the obligation to shape the debates of our time – not only with the votes we cast, but with the voices we lift in defense of our most ancient values and enduring ideals.

Let each of us now embrace, with solemn duty and awesome joy, what is our lasting birthright. With common effort and common purpose, with passion and dedication, let us answer the call of history, and carry into an uncertain future that precious light of freedom.

Thank you, God Bless you, and may He forever bless these United States of America.
Now it is your turn to be the detective!

Throughout this speech, there are a number of logical fallacies which fit into the ‘Straw Man’ category – that is when a person misrepresents the argument of their opposition to make them easier to attack.

“By exaggerating, misrepresenting, or just completely fabricating someone's argument, it's much easier to present your own position as being reasonable, but this kind of dishonesty serves to undermine honest rational debate.” (https://yourlogicalfallacyis.com/strawman)

Your task – Identify five ‘straw man’ logical fallacies used in this speech.

For each fallacy you identify you must;

1) Reference the location of the fallacy in the speech by providing a direct quote

2) Explain why this is a ‘straw man’ fallacy.
Identify five ‘straw man’ logical fallacies

1.

2.

3.

4.

5.
Background Information

Epistemology is the study of knowledge and justified belief. It is concerned with key questions such as:

- What are the necessary and sufficient conditions of knowledge?
- What are its sources?
- What is its structure, and what are its limits?

It aims to answer questions such as:

- How are we to understand the concept of justification?
- What makes justified beliefs justified?
- Is justification internal or external to one’s mind?

There are differing approaches to the answering of such questions. Two such approaches are:

Evidence vs. Reliability

- According to **evidentialists** the possession of evidence is what makes beliefs justified.
- According to **reliabilists** the processes and thoughts involved in proving a theory are what make a belief justified.
- **Internalism** and externalism are two opposing ways of explaining various subjects in several areas of philosophy. Usually 'internalism' refers to the belief that an explanation can be given of the given subject by pointing to things which are internal to the person or their mind which is considering them. Conversely, **externalism** holds that it is things about the world which motivate us, justify our beliefs and determine meaning.

Logic and Logical Fallacy – Examples of differing types of Logical Fallacies

- Strawman – Misrepresenting someone’s argument to make it easier to attack
- Middle ground - Claiming that a compromise or middle point between two arguments is the truth
- False Cause - Presuming that a real or perceived relationship between things means that one is the cause of the other.
- Appeal to nature - Making the argument that because something is 'natural' it is therefore valid, justified, inevitable, good, or ideal.
- Special Pleading - Moving the goalposts or making up exceptions when a claim is shown to be false.
- Ambiguity -Using double meanings or ambiguities of language to mislead or misrepresent the truth.
- Personal incredulity - Saying that because one finds something difficult to understand that it's therefore not true.
- Burden of Proof - Saying that the burden of proof lies not with the person making the claim, but with someone else to disprove.

Euler Diagram –

A Euler diagram is a diagrammatic means of representing sets and their relationships. The first use of "Eulerian circles" is commonly attributed to Swiss mathematician Leonhard Euler (1707–1783). They are closely related to Venn diagrams.

Validity of Arguments - An argument is deductively valid (or, for short, just "valid") when the conclusion is entailed by, or logically follows from, the premises.
Philosophy

Session 1

‘All our knowledge has its origins in our perceptions’ Leonardo da Vinci.

Solutions
Section 1: Knowledge and Understanding (10 marks - 1 per question)

Epistemology

Write TRUE or FALSE next to the following statements about branches of Epistemology:

- Evidentialism asserts the notion that what makes a belief justified is the possession of evidence. **TRUE**
- Reliabilism argues that a belief has a high probability of truth if the belief is embedded in reliable cognitive processes or faculties. **TRUE**
- Evidentialism is typically associated with externalism **FALSE**
- Evidentialists argue that evidence consists of perceptual introspective, memorial and intuitional experiences. **TRUE**
- Reliabilists argue that a belief is justified if, and only if, it results from cognitive origin that is reliable. **TRUE**
- Reliabilism is typically associated with internalism **FALSE**
- Reliabilists believe if the justification of one’s beliefs is determined by the reliability of one’s belief sources, justification will always be recognisable on reflection. **FALSE**
- Internalism with regard justification is the idea that everything necessary to provide justification for a belief must be immediately available to an agent's consciousness **TRUE**
- Externalists would argue that only external conditions can imply objective probability **TRUE**
- A motivational externalist thinks that moral judgments about the right thing to do not necessitate some motivation to do those things that are judged to be the right thing to do; rather, an independent desire—such as the desire to do the right thing—is required. **TRUE**
Section Two – Logic and Logical Fallacy

Identify the logical fallacy in each of these scenarios;

1) In examining a graph of rising sea levels around the world, Brian observes that the number of petrol tankers on the oceans has also increased in recent years. Brian deduces that the depth of these enormous boats is the cause of the rising sea levels, not global warming.  
This is an example of:

a) Strawman  
b) Personal incredulity  
c) False cause

2) Garry claimed to have psychic powers. When these powers were tested under scientific conditions and he was unable to demonstrate any such skills, he claimed that they would only work on people who had faith in his gift.  
This is an example of:

a) special pleading  
b) appeal to nature  
c) burden of proof

3) The ‘Natural Springs’ water company promoted their product as having health benefits above and beyond medicines because it is an entirely natural product from the springs of Tasmania.  
This is an example of:

a) ambiguity  
b) appeal to nature  
c) middle ground

Section Three: Euler Diagrams
Match the explanation with the diagram

<table>
<thead>
<tr>
<th>Image A</th>
<th>Image B</th>
<th>Image C</th>
<th>Image D</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Diagram A" /></td>
<td><img src="image2.png" alt="Diagram B" /></td>
<td><img src="image3.png" alt="Diagram C" /></td>
<td><img src="image4.png" alt="Diagram D" /></td>
</tr>
</tbody>
</table>

1) All A are B – **Image A**
2) Some A is in B – **Image C**
3) Some A is not in B – **Image D**
4) No A is B – **Image B**

Create a Euler diagram to assess the validity of argument in the following image;

Valid and Invalid logical reasoning:
Detectives Smith and Jones are engaged in a discussion at a Crime Scene. They arrive at a number of valid and invalid conclusions throughout the course of their discussion. Determine whether their conclusions are valid or invalid and circle the correct answer.

Detective Smith: All home robberies of this kind in the past have been carried out using a crow- bar to get in the front door.

Detective Jones: Crow bars are the most effective way to break into a home.

Conclusion: The criminal who burgled this home used a crow bar as his means of entry.

VALID
INVALID

Detective Smith: On all the cases where we have worked together, we have solved the case within two weeks.

Detective Jones: When we work by ourselves, we take an average of four weeks to crack the case.

Conclusion: If the detectives work on the case together, they will solve it in half the time.

VALID
INVALID

Detective Smith: We have detected some clear fingerprints from the safe the criminal tried to remove from the home.

Detective Jones: Yes, they match the fingerprints from known criminal ‘Sticky Fingers’ Pete.

Conclusion: ‘Sticky Fingers’ Pete tried to steal the safe.

VALID
INVALID

Barack Obama’s Second Inaugural Speech
The following is a transcript of President Obama’s second inaugural speech.

MR. OBAMA: Vice President Biden, Mr Chief Justice, Members of the United States Congress, distinguished guests, and fellow citizens:

Each time we gather to inaugurate a President we bear witness to the enduring strength of our Constitution. We affirm the promise of our democracy. We recall that what binds this nation together is not the colors of our skin or the tenets of our faith or the origins of our names. What makes us exceptional – what makes us American – is our allegiance to an idea, articulated in a declaration made more than two centuries ago:

“We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable rights, that among these are Life, Liberty, and the pursuit of Happiness.”

Today we continue a never-ending journey, to bridge the meaning of those words with the realities of our time. For history tells us that while these truths may be self-evident, they have never been self-executing; that while freedom is a gift from God, it must be secured by His people here on Earth. The patriots of 1776 did not fight to replace the tyranny of a king with the privileges of a few or the rule of a mob. They gave to us a Republic, a government of, and by, and for the people, entrusting each generation to keep safe our founding creed.

For more than two hundred years, we have.

Through blood drawn by lash and blood drawn by sword, we learned that no union founded on the principles of liberty and equality could survive half-slave and half-free. We made ourselves anew, and vowed to move forward together.
Together, we determined that a modern economy requires railroads and highways to speed travel and commerce; schools and colleges to train our workers.

Together, we discovered that a free market only thrives when there are rules to ensure competition and fair play.

Together, we resolved that a great nation must care for the vulnerable, and protect its people from life’s worst hazards and misfortune.

Through it all, we have never relinquished our skepticism of central authority, nor have we succumbed to the fiction that all society’s ills can be cured through government alone. Our celebration of initiative and enterprise; our insistence on hard work and personal responsibility, these are constants in our character.

But we have always understood that when times change, so must we; that fidelity to our founding principles requires new responses to new challenges; that preserving our individual freedoms ultimately requires collective action. For the American people can no more meet the demands of today’s world by acting alone than American soldiers could have met the forces of fascism or communism with muskets and militias. No single person can train all the math and science teachers we’ll need to equip our children for the future, or build the roads and networks and research labs that will bring new jobs and businesses to our shores. Now, more than ever, we must do these things together, as one nation, and one people.

This generation of Americans has been tested by crises that steeled our resolve and proved our resilience. A decade of war is now ending. An economic recovery has begun. America’s possibilities are limitless, for we possess all the qualities that this world without boundaries demands: youth and drive; diversity and openness; an endless capacity for risk and a gift for reinvention. My fellow Americans, we are made for this moment, and we will seize it – so long as we seize it together.

For we, the people, understand that our country cannot succeed when
a shrinking few do very well and a growing many barely make it. We believe that America’s prosperity must rest upon the broad shoulders of a rising middle class. We know that America thrives when every person can find independence and pride in their work; when the wages of honest labor liberate families from the brink of hardship. We are true to our creed when a little girl born into the bleakest poverty knows that she has the same chance to succeed as anybody else, because she is an American, she is free, and she is equal, not just in the eyes of God but also in our own.

We understand that outworn programs are inadequate to the needs of our time. We must harness new ideas and technology to remake our government, revamp our tax code, reform our schools, and empower our citizens with the skills they need to work harder, learn more, reach higher. But while the means will change, our purpose endures: a nation that rewards the effort and determination of every single American. That is what this moment requires. That is what will give real meaning to our creed.

We, the people, still believe that every citizen deserves a basic measure of security and dignity. We must make the hard choices to reduce the cost of health care and the size of our deficit. But we reject the belief that America must choose between caring for the generation that built this country and investing in the generation that will build its future. For we remember the lessons of our past, when twilight years were spent in poverty, and parents of a child with a disability had nowhere to turn. We do not believe that in this country, freedom is reserved for the lucky, or happiness for the few. We recognize that no matter how responsibly we live our lives, any one of us, at any time, may face a job loss, or a sudden illness, or a home swept away in a terrible storm. The commitments we make to each other – through Medicare, and Medicaid, and Social Security – these things do not sap our initiative; they strengthen us. They do not make us a nation of takers; they free us to take the risks that make this country great.
We, the people, still believe that our obligations as Americans are not just to ourselves, but to all posterity. We will respond to the threat of climate change, knowing that the failure to do so would betray our children and future generations. Some may still deny the overwhelming judgment of science, but none can avoid the devastating impact of raging fires, and crippling drought, and more powerful storms. The path towards sustainable energy sources will be long and sometimes difficult. But America cannot resist this transition; we must lead it. We cannot cede to other nations the technology that will power new jobs and new industries – we must claim its promise. That’s how we will maintain our economic vitality and our national treasure – our forests and waterways; our croplands and snowcapped peaks. That is how we will preserve our planet, commanded to our care by God. That’s what will lend meaning to the creed our fathers once declared.

We, the people, still believe that enduring security and lasting peace do not require perpetual war. Our brave men and women in uniform, tempered by the flames of battle, are unmatched in skill and courage. Our citizens, seared by the memory of those we have lost, know too well the price that is paid for liberty. The knowledge of their sacrifice will keep us forever vigilant against those who would do us harm. But we are also heirs to those who won the peace and not just the war, who turned sworn enemies into the surest of friends, and we must carry those lessons into this time as well.

We will defend our people and uphold our values through strength of arms and rule of law. We will show the courage to try and resolve our differences with other nations peacefully – not because we are naïve about the dangers we face, but because engagement can more durably lift suspicion and fear. America will remain the anchor of strong alliances in every corner of the globe; and we will renew those institutions that extend our capacity to manage crisis abroad, for no one has a greater stake in a peaceful world than its most powerful nation. We will support democracy from Asia to Africa; from the Americas to the Middle East, because our interests and our conscience compel us to act on behalf of those who long for freedom.
And we must be a source of hope to the poor, the sick, the marginalized, the victims of prejudice – not out of mere charity, but because peace in our time requires the constant advance of those principles that our common creed describes: tolerance and opportunity; human dignity and justice.

We, the people, declare today that the most evident of truths – that all of us are created equal – is the star that guides us still; just as it guided our forebears through Seneca Falls, and Selma, and Stonewall; just as it guided all those men and women, sung and unsung, who left footprints along this great Mall, to hear a preacher say that we cannot walk alone; to hear a King proclaim that our individual freedom is inextricably bound to the freedom of every soul on Earth.

It is now our generation’s task to carry on what those pioneers began. For our journey is not complete until our wives, our mothers, and daughters can earn a living equal to their efforts. Our journey is not complete until our gay brothers and sisters are treated like anyone else under the law – for if we are truly created equal, then surely the love we commit to one another must be equal as well. Our journey is not complete until no citizen is forced to wait for hours to exercise the right to vote. Our journey is not complete until we find a better way to welcome the striving, hopeful immigrants who still see America as a land of opportunity; until bright young students and engineers are enlisted in our workforce rather than expelled from our country. Our journey is not complete until all our children, from the streets of Detroit to the hills of Appalachia to the quiet lanes of Newtown, know that they are cared for, and cherished, and always safe from harm.

That is our generation’s task – to make these words, these rights, these values – of Life, and Liberty, and the Pursuit of Happiness – real for every American. Being true to our founding documents does not require us to agree on every contour of life; it does not mean we all define liberty in exactly the same way, or follow the same precise path to happiness. Progress does not compel us to settle centuries-long debates about the role of government for all time – but it does require us to act in our time.
For now decisions are upon us, and we cannot afford delay. We cannot mistake absolutism for principle, or substitute spectacle for politics, or treat name-calling as reasoned debate. We must act, we must act knowing that our work will be imperfect. We must act, knowing that today’s victories will be only partial, and that it will be up to those who stand here in four years, and forty years, and four hundred years hence to advance the timeless spirit once conferred to us in a spare Philadelphia hall.

My fellow Americans, the oath I have sworn before you today, like the one recited by others who serve in this Capitol, was an oath to God and country, not party or faction – and we must faithfully execute that pledge during the duration of our service. But the words I spoke today are not so different from the oath that is taken each time a soldier signs up for duty, or an immigrant realizes her dream. My oath is not so different from the pledge we all make to the flag that waves above and that fills our hearts with pride.

They are the words of citizens, and they represent our greatest hope.

You and I, as citizens, have the power to set this country’s course.

You and I, as citizens, have the obligation to shape the debates of our time – not only with the votes we cast, but with the voices we lift in defense of our most ancient values and enduring ideals.

Let each of us now embrace, with solemn duty and awesome joy, what is our lasting birthright. With common effort and common purpose, with passion and dedication, let us answer the call of history, and carry into an uncertain future that precious light of freedom.

Thank you, God Bless you, and may He forever bless these United States of America.
Now it is your turn to be the detective!

Throughout this speech, there are a number of logical fallacies which fit into the ‘Straw Man’ category – that is when a person misrepresents the argument of their opposition to make them easier to attack.

“By exaggerating, misrepresenting, or just completely fabricating someone's argument, it's much easier to present your own position as being reasonable, but this kind of dishonesty serves to undermine honest rational debate.”
(https://yourlogicafalccyis.com/strawman)

Your task – Identify five ‘straw man’ logical fallacies used in this speech.

For each fallacy you identify you must;

1) Reference the location of the fallacy in the speech by providing a direct quote

2) Explain why this is a ‘straw man’ fallacy.
Students can reference any FIVE of the following eight examples

One mark for the quote

One mark for the explanation

Straw Man #1:

“For the American people can no more meet the demands of today’s world by acting alone than American soldiers could have met the forces of fascism or communism with muskets and militias.”

The President’s line about muskets and militias is a rhetorical flourish more than an argument, but the first part of this line is an obvious straw man. No one in the current political climate is arguing for a complete dissolution of government power such that only the American people as a collective would be responsible for defending the country or performing any other task. Rather, the question is how much responsibility should be left to private citizens. Saying “private citizens cannot handle all responsibilities” is not the same as saying “private citizens cannot handle any responsibility at all.”

Straw Man #2:

“No single person can train all the math and science teachers we’ll need to equip our children for the future, or build the roads and networks and research labs that will bring new jobs and businesses to our shores.”

Like the first straw man, this one argues against something which is obviously false, and which no one believes. A single, individual person obviously cannot do all of this alone, but again, that does not imply that if someone cannot do something alone, the government must step in and do it for them. For instance, an architect cannot build a skyscraper alone. He needs laborers, engineers, and other people. But saying he can’t do this alone is not the same thing as saying that private citizens cannot cooperatively agree to do this without help from the government.

Straw Man #3:

“We reject the belief that America must choose between caring for the generation that built this country and investing in the generation that will build its future. For we remember the lessons of our past, when twilight years were spent in poverty and parents of a child with a disability had nowhere to turn.”

No one is proposing completely giving up caring for older generations, nor is anyone proposing completely ignoring young people’s needs. The question is how much government can afford to spend on each. More to the point, no one on either side is proposing complete abolition of programs that help the elderly or the disabled.

Straw Man #4:

“Some may still deny the overwhelming judgment of science, but none can avoid the devastating impact of raging fires and crippling drought and more powerful storms.”
This straw man, which deals with global warming, is actually two fallacies in one. It is a straw man because no one believes they can avoid the impact of natural disasters completely, and it also begs the question by assuming that solving global warming will solve the problem of fires, drought and storms, while simultaneously trying to prove that by solving global warming, natural disasters will be lessened.

**Straw Man #5**

“We, the people, still believe that enduring security and lasting peace do not require perpetual war.”

The President’s critics on national security do not believe in perpetual war. They may believe in seeing some wars through to their conclusion, or starting other wars out of necessity, but none of them believes in perpetual war for its own sake.

**Straw Man #6:**

“Our journey is not complete until our gay brothers and sisters are treated like anyone else under the law, for if we are truly created equal, then surely the love we commit to one another must be equal as well.”

Again, there are no mainstream political figures who believe that gays should be unequal before the law. The question of whether the right to marriage is one of those constitutional protections, however, is an unresolved question, though the Supreme Court may resolve it later this year. This straw man also assumes that the only function of marriage is to facilitate love. That is certainly one view, but it is not one that all critics of gay marriage subscribe to, and thus assuming that they oppose gay marriage out of opposition to love is a straw man.

**Straw Man #7:**

“Our journey is not complete until we find a better way to welcome the striving, hopeful immigrants who still see America as a land of opportunity.”

Shutting off immigration completely is not a policy proposal being offered. What is being argued about is the question of what to do with people who immigrated to the US in contradiction to its laws.

**Straw Man #8:**

“Being true to our founding documents does not require us to agree on every contour of life. It does not mean we all define liberty in exactly the same way or follow the same precise path to happiness.”

This is obviously true, but is also a straw man because no one believes that following a blueprint for governance requires the people following that blueprint to make all the same lifestyle choices. This is not even an argument that constitutional originalists on the Supreme Court advance. The President is arguing against a position that is not held by his critics.
NSW da Vinci
Decathlon
An academic gala day
for Year 7/8 students

Science Answers

Session 1
Team Number ______________
Part 1: Science in Mayhem – Disease Outbreak

Task: You are a team of epidemiologists that needs to determine what is causing a deadly infection sweeping the world. Solve the mystery of how the first victims were infected so a cure can be created to save the world from complete mayhem!

Use the following definitions to help you with your answers

<table>
<thead>
<tr>
<th>Epidemiology</th>
<th>The branch of medical science dealing with the incidence, distribution and control of disease in a population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteria</td>
<td>A single celled microorganism, whose genetic material is not enclosed by a membrane (not in the nucleus). Multiply on their own through simple division.</td>
</tr>
<tr>
<td>Epidemic</td>
<td>A widespread occurrence of an infectious disease in a community at a particular time.</td>
</tr>
<tr>
<td>Pandemic</td>
<td>An infectious disease prevalent over a whole country or the world.</td>
</tr>
<tr>
<td>Virus</td>
<td>A microscopic pocket of protein (membrane) that contains genetic material. They cannot multiply on their own.</td>
</tr>
</tbody>
</table>

Source: adapted from CDC, State Government Victoria and The University of Rochester Medical Centre

1. Describe 3 ways that an infection can spread:
   a. ……………………………………………………………………………………………………………
      ……………………………………………………………………………………………………………
   b. ……………………………………………………………………………………………………………
      ……………………………………………………………………………………………………………
   c. ……………………………………………………………………………………………………………
      ……………………………………………………………………………………………………………

   /3 marks

2. The first known victims were all found to have dined at the same restaurant the night they were infected. Scientists have interviewed family and friends of these victims to determine what they did at the restaurant that night. Use the interview information to fill in the table.

   Emma (Emily’s friend) – “When we got to the restaurant, we asked to sit under the air-conditioning as we were both really hot. The waitress delivered us some tap water but when she did she coughed right in Emily’s face! I didn’t want any ice but Emily had some in her water. I had fish for dinner and she had chicken.”

   Donovan (Anne’s husband) – “Anne and I were going out for our anniversary. She accidentally spilled some chicken on her new top so she had to use the tap water we were drinking to get the stain out. When the waitress came to pick up our plates, she coughed right on Anne.”
Emily

- Ate chicken for main course
- Drank tap water
- Shook hands with the waiter
- Sat at a table directly under the air-conditioning
- Had icecubes in their drink
- Waitress coughed on them

David

- Ate chicken for main course
- Drank tap water
- Shook hands with the waiter
- Sat at a table directly under the air-conditioning
- Had icecubes in their drink
- Waitress coughed on them

Roger

- Ate chicken for main course
- Drank tap water
- Shook hands with the waiter
- Sat at a table directly under the air-conditioning
- Had icecubes in their drink
- Waitress coughed on them

Anne

- Ate chicken for main course
- Drank tap water
- Shook hands with the waiter
- Sat at a table directly under the air-conditioning
- Had icecubes in their drink
- Waitress coughed on them

3. Based on your answers to Q1 and Q2, state how the victims were infected.

4. Different numbers of victims have been infected in different countries.
Calculate the ratio of the population (infected vs uninfected) in each country

a. USA =

b. Asia =

c. Africa =

5. Which country/continent has experienced the highest ratio of infection?

/1 mark

6. In no more than 2 sentences, explain what the difference is between an epidemic and a pandemic?

/2 marks

7. Is this infection an epidemic or a pandemic? Use evidence to support your answer.

/2 marks
8. Diagram A and B show the structures of a virus and bacteria.

**Diagram A – Virus Structure**

**Diagram B – Bacteria Structure**

a) Using these diagrams, and the information in the definitions, fill in this table of differences for viruses and bacteria

<table>
<thead>
<tr>
<th></th>
<th>Virus</th>
<th>Bacteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Is it a cell?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Is the DNA contained?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>What types of DNA are present?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Can they multiply on their own?</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

/8 marks

Sample 1 – Infection sample under a microscope
b) Sample 1 is of the infection. Were the victims infected with a virus or bacteria? (Support your answer with evidence) /3 marks

Subtotal: _______ / 35 marks

Reference List
http://learn.genetics.utah.edu/content/science/viruses/
http://www.bbc.co.uk/schools/gcsebitesize/science/add_edexcel/cells/cells1.shtml
http://www.urmc.rochester.edu/encyclopedia/content.aspx?ContentTypeID=1&ContentID=2089

Part 2: Mystery – Forensic Science

TASK: Your team are forensic scientists that need to solve the mystery of who released the deadly infection sweeping the world and save it from complete mayhem! If you can find out who is responsible, you will be able to find the serum that can cure the deadly disease.

Police are called to a murder scene at Biotex Laboratory. This is a facility where scientists do research on diseases and their cures. Here’s the police report:

**Background Information of the Crime**

A murder was committed during the night. The victim was identified as a single, 32-year-old, male. His body was found lying on the floor of his office at 5:45AM by the custodial staff. He was already dead; the body was cold and stiff. The room was a mess, as if a struggle had taken place. Soon afterwards, the medical examiner (ME) arrived and took the body back to the lab in order to perform an autopsy to determine the cause of death. Before he left, they outlined the position of the body with tape.

The report from the ME is conclusive. A blunt object fractured his skull. He had some bruising on his face; his arms and hands were also scratched.

None of the other items at the scene were disturbed after the body was discovered.

Source: Medical Learning Activities II, Curriculum and Instructional Materials Center
1. Besides fingerprints, make a list of five other pieces of evidence that could be recovered or investigated at the crime scene that may assist investigators to solve the crime.

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

_____________________________________________________________________________

/5 marks

The dead body is identified as Dr Michael Willsden, who is an employee of Biotex. The other people with access to the laboratory that night were custodian, Jessica Evans – the laboratory administrator, Deanna Sinclair – the laboratory technician and two other scientists who work in the laboratory: Dr Juan Valdez and Dr Sarah Wang.

Forensic scientists are often able to collect blood samples, pieces of flesh, hair samples, and mucus from the nose and throat and, from rape victims, semen samples. They can use these samples to carry out a process known as DNA profiling.

Several different biological specimens were found near Dr Willsden’s body, and your research team has produced DNA profiles of the people they belong to. They also produced DNA profiles of the victim and other people who could have entered the office.

![DNA - victim and suspects](image_url)

**Figure 5** DNA – victim and suspects
Any DNA found places them at the crime scene evening of the murder, as other witnesses say that the floor had been cleaned at about 5pm, removing any DNA evidence prior to this time.

a. Identify which DNA samples belongs to which people:

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

/4 marks

b. Which people did not have DNA samples found at the scene? Does this rule them out completely as suspects?

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

/3 marks

Figure 6 DNA - Crime Scene
2. One of the most useful pieces of evidence is a fingerprint. Everyone has their own set of fingerprints, even identical twins. Fingerprints are made up of a series of ridges. The ridges make up patterns.

Fingerprints will always be taken from the people who work in an office or have a legitimate reason for being in the office, so that they can be compared with all the prints found at the scene.

a. What are fingerprints and how are they formed?

_____________________________________________________________________________________

/2 marks

b. Why are they useful in crime scene investigations?

_____________________________________________________________________________________

/1 mark

At Biotex Laboratory, prints were found on the glass doors of the cabinet in which the serums that the scientists are working on are kept, on the inside handle of the office door and on the fire extinguisher found near the entrance of the office.

Figure 1  Fingerprints found at the scene of the crime.

Figure 2  Fingerprints taken from Dr. Valdez.
c. Match the fingerprints found at the scene with those of Dr Wang, Dr Valdez and the custodian.

i. Were Dr Valdez’s fingerprints found? Is this what would be expected?

ii. Were the custodian’s fingerprints found? Is this what would be expected?

iii. Were Dr Wang’s fingerprints found? Is this what would be expected?
d. What evidence do you now have that will help you determine who committed the crime?

Figure 6
3. Footprints were found exiting the building (see figure 6). A member of your team placed a scale ruler next to the footprint. The scale measures lengths up to 30 cm, and the shoe length is approximately 27 cm.

a. What characteristics of the shoeprints could be useful in distinguishing the shoes that made these prints from other shoes with the same tread?
b. Suggest other information that the police may be able to gain from the shoeprints.

c. Use the graph in figure 7 above to work out a possible height for the person who made the prints.

The heights of the three people who were in the building on the night of the crime are:

<table>
<thead>
<tr>
<th>Person</th>
<th>Height (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custodian</td>
<td>185</td>
</tr>
<tr>
<td>Dr Valdez</td>
<td>160</td>
</tr>
<tr>
<td>Dr Wang</td>
<td>178</td>
</tr>
</tbody>
</table>

d. Which of the above people is most likely responsible for making the shoe print?

e.

4. From the evidence gained by your team in questions, complete the following table to see which of the suspects is most likely the perpetrator:

<table>
<thead>
<tr>
<th>Evidence type</th>
<th>Custodian</th>
<th>Dr Valdez</th>
<th>Dr Wang</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNA profiling</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fingerprints
Shoe print

a. The most likely perpetrator is: _____________________________________ /3 marks

5. Complete the following table for human bones:

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
</tr>
</thead>
<tbody>
<tr>
<td>cranium</td>
<td></td>
</tr>
<tr>
<td>mandible</td>
<td></td>
</tr>
<tr>
<td>clavicle</td>
<td></td>
</tr>
<tr>
<td>scapula</td>
<td></td>
</tr>
<tr>
<td>sternum</td>
<td></td>
</tr>
<tr>
<td>humerus</td>
<td></td>
</tr>
<tr>
<td>patella</td>
<td></td>
</tr>
<tr>
<td>tibia</td>
<td></td>
</tr>
</tbody>
</table>

/4 marks

Subtotal: _______ / 35 marks

Total: _______ / 70 marks

Reference List
http://www.pbs.org/wgbh/nova/education/body/create-dna-fingerprint.html
Heinemann eLearning 9 © Reed International Books Australia Pty Ltd
NSW da Vinci Decathlon

An academic gala day for Year 7/8 students

Science Answers


Session 1

Team Number ___________
Part 1: Science in Mayhem – Disease Outbreak

Task: You are a team of epidemiologists that needs to determine what is causing a deadly infection sweeping the world. Solve the mystery of how the first victims were infected so a cure can be created to save the world from complete mayhem!

Use the following definitions to help you with your answers

<table>
<thead>
<tr>
<th>Epidemiology</th>
<th>The branch of medical science dealing with the incidence, distribution and control of disease in a population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteria</td>
<td>A single celled microorganism, whose genetic material is not enclosed by a membrane (not in the nucleus). Multiply on their own through simple division.</td>
</tr>
<tr>
<td>Epidemic</td>
<td>A widespread occurrence of an infectious disease in a community at a particular time.</td>
</tr>
<tr>
<td>Pandemic</td>
<td>An infectious disease prevalent over a whole country or the world.</td>
</tr>
<tr>
<td>Virus</td>
<td>A microscopic pocket of protein (membrane) that contains genetic material. They cannot multiply on their own.</td>
</tr>
</tbody>
</table>

Source: adapted from CDC, State Government Victoria and The University of Rochester Medical Centre

1. Describe 3 ways that an infection can spread:

   Possible answers: airborne, contaminated water/food, direct/indirect contact with other people, soiled objects, sexual contact

   /3 marks

2. The first known victims were all found to have dined at the same restaurant the night they were infected. Scientists have interviewed family and friends of these victims to determine what they did at the restaurant that night. Use the interview information to fill in the table.

**Emma (Emily’s friend)** – “When we got to the restaurant, we asked to sit under the air-conditioning as we were both really hot. The waitress delivered us some tap water but when she did she coughed right in Emily’s face! I didn’t want any ice but Emily had some in her water. I had fish for dinner and she had chicken.”

**Donovan (Anne’s husband)** – “Anne and I were going out for our anniversary. She accidentally spilled some chicken on her new top so she had to use the tap water we were drinking to get the stain out. When the waitress came to pick up our plates, she coughed right on Anne.”
Emily

Ate chicken for main course ✓
Drank tap water ✓
Shook hands with the waiter
Sat at a table directly under the air-conditioning ✓
Had icecubes in their drink ✓
Waitress coughed on them ✓

David

Ate chicken for main course ✓
Drank tap water ✓
Shook hands with the waiter ✓
Sat at a table directly under the air-conditioning ✓
Had icecubes in their drink ✓
Waitress coughed on them ✓

Roger

Ate chicken for main course ✓
Drank tap water ✓
Shook hands with the waiter ✓
Sat at a table directly under the air-conditioning ✓
Had icecubes in their drink ✓
Waitress coughed on them ✓

Anne

Ate chicken for main course ✓
Drank tap water ✓
Shook hands with the waiter
Sat at a table directly under the air-conditioning ✓
Had icecubes in their drink ✓
Waitress coughed on them ✓

3. Based on your answers to Q1 and Q2, state how the victims were infected.

The victims were infected through an airborne infection that the waitress coughed on them

4. Different numbers of victims have been infected in different countries.
Calculate the ratio of the population (infected vs uninfected) in each country

a. USA = \( \frac{100,000,000}{300,000,000} = 33.33\% \)

b. Asia = \( \frac{800,000,000}{4,300,000,000} = 18.60\% \)

c. Africa = \( \frac{300,000,000}{1,000,000,000} = 30\% \)

5. Which country/continent has experienced the highest ratio of infection? USA

6. In no more than 2 sentences, explain what the difference is between an epidemic and a pandemic?

Epidemic is an outbreak of disease in a localised place, pandemic is an outbreak of disease over a whole country or world.

7. Is this infection an epidemic or a pandemic? Use evidence to support your answer.

Pandemic. It is shown to have spread to multiple continents.

8. Diagram A and B show the structures of a virus and bacteria.
a) Using these diagrams, and the information in the definitions, fill in this table of differences for viruses and bacteria

<table>
<thead>
<tr>
<th></th>
<th>Virus</th>
<th>Bacteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is it a cell?</td>
<td>×</td>
<td>✓</td>
</tr>
<tr>
<td>Is the DNA contained?</td>
<td>✓</td>
<td>×</td>
</tr>
<tr>
<td>What types of DNA are present?</td>
<td>DNA, RNA</td>
<td>Chromosomal, Plasmid</td>
</tr>
<tr>
<td>Can they multiply on their own?</td>
<td>×</td>
<td>✓</td>
</tr>
</tbody>
</table>

/8 marks

Sample 1 – Infection sample under a microscope

Source: CNN

b) Sample 1 is of the infection. Were the victims infected with a virus or bacteria?
(Support your answer with evidence)

Virus. Evidence: Can see the ligands and membrane, no flagellum

/3 marks

Subtotal: ______ / 35 marks

Reference List
http://learn.genetics.utah.edu/content/science/viruses/
http://www.bbc.co.uk/schools/gcsebitesize/science/add_edexcel/cells/cells1.shtml
http://www.urmc.rochester.edu/encyclopedia/content.aspx?ContentTypeID=1&ContentID=2089
Part 2: Mystery – Forensic Science

TASK: Your team are forensic scientists that need to solve the mystery of who released the deadly infection sweeping the world and save it from complete mayhem! If you can find out who is responsible, you will be able to find the serum that can cure the deadly disease.

Police are called to a murder scene at Biotex Laboratory. This is a facility where scientists do research on diseases and their cures. Here’s the police report:

Background Information of the Crime

A murder was committed during the night. The victim was identified as a single, 32-year-old, male. His body was found lying on the floor of his office at 5:45 AM by the custodial staff. He was already dead; the body was cold and stiff. The room was a mess, as if a struggle had taken place. Soon afterwards, the medical examiner (ME) arrived and took the body back to the lab in order to perform an autopsy to determine the cause of death. Before he left, they outlined the position of the body with tape.

The report from the ME is conclusive. A blunt object fractured his skull. He had some bruising on his face; his arms and hands were also scratched.

None of the other items at the scene were disturbed after the body was discovered.

Source: Medical Learning Activities II, Curriculum and Instructional Materials Center

1. Besides fingerprints, make a list of five other pieces of evidence that could be recovered or investigated at the crime scene that may assist investigators to solve the crime.
   __Answers may include: fibres, hairs, impressions (shoe prints, weapon marks etc.), blood spots/spatter patterns, documents, body fluids, broken glass pieces, potential weapons, keycards, mobile phones, email accounts etc. ________________________________________________
   ______________________________________________________________________________
   ______________________________________________________________________________
   ______________________________________________________________________________
   ______________________________________________________________________________
   ______________________________________________________________________________

   /5 marks

The dead body is identified as Dr Michael Willsden, who is an employee of Biotex. The other people with access to the laboratory that night were custodian, Jessica Evans – the laboratory administrator, Deanna Sinclair – the laboratory technician and two other scientists who work in the laboratory: Dr Juan Valdez and Dr Sarah Wang.
Forensic scientists are often able to collect blood samples, pieces of flesh, hair samples, and mucus from the nose and throat and, from rape victims, semen samples. They can use these samples to carry out a process known as DNA profiling.

Several different biological specimens were found near Dr Willsden’s body, and your research team has produced DNA profiles of the people they belong to. They also produced DNA profiles of the victim and other people who could have entered the office.

**Figure 5** DNA – victim and suspects

A: Dr Willsden  
B: Custodian  
C: Dr Valdez  
D: Dr Wang  
E: Jessica Evans  
F: Deanna Sinclair

**Figure 6** DNA - Crime Scene
Any DNA found places them at the crime scene evening of the murder, as other witnesses say that the floor had been cleaned at about 5pm, removing any DNA evidence prior to this time.

a. Identify which DNA samples belong to which people:
   1 - Dr Willsden
   2 - Dr Wang
   3 - Dr Valdez
   4 - Custodian

b. Which people did not have DNA samples found at the scene? Does this rule them out completely as suspects?
   Jessica Evans and Deanna Sinclair. No, does not rule them out, but just means they did not leave any biological / DNA samples, or that samples they may have left were not found.

2. One of the most useful pieces of evidence is a fingerprint. Everyone has their own set of fingerprints, even identical twins. Fingerprints are made up of a series of ridges. The ridges make up patterns. Fingerprints will always be taken from the people who work in an office or have a legitimate reason for being in the office, so that they can be compared with all the prints found at the scene.
   a. What are fingerprints and how are they formed?
      Fingerprints are formed when fingers come into contact with certain surfaces. They come from a set of ridges on fingers that help to grip objects.

   b. Why are they useful in crime scene investigations?
      Fingerprints are unique to every individual, enabling identification of people who touched an object(s) at a crime scene.
At Biotex Laboratory, prints were found on the glass doors of the cabinet in which the serums that the scientists are working on are kept, on the inside handle of the office door and on the fire extinguisher found near the entrance of the office.

Figure 1  Fingerprint found at the scene of the crime.

Figure 2  Fingerprint taken from Dr. Valdez.

Figure 3  Fingerprint taken from the custodian.

Figure 4  Fingerprint taken from Dr Wang.

Source: Adapted from Heinemann eLearning 9 © Reed International Books Australia Pty Ltd
c. Match the fingerprints found at the scene with those of Dr Wang, Dr Valdez and the custodian.
   i. Were Dr Valdez’s fingerprints found? Is this what would be expected?
      _____ Yes (the last two prints). Expected as he works there.

   ii. Were the custodian’s fingerprints found? Is this what would be expected?
       _____ Yes (the first two prints). Expected as he works there.

   iii. Were Dr Wang’s fingerprints found? Is this what would be expected?
        _____ No. Her prints may have been found as she works there, but they generally wear latex
gloves while working in a laboratory.

   /3 marks

d. What evidence do you now have that will help you determine who committed the crime?
   _____ This means that Dr Wang and the Custodian both left fingerprints (without gloves) on either the
glass doors of the serum cabinet, the inside handle of the office door and on the fire extinguisher.

   /2 marks
3. Footprints were found exiting the building (see figure 6). A member of your team placed a scale ruler next to the footprint. The scale measures lengths up to 30 cm, and the shoe length is approximately 27 cm.

a. What characteristics of the shoeprints could be useful in distinguishing the shoes that made these prints from other shoes with the same tread?
   _____size/length, irregularities in the tread pattern, depth of pattern – especially in certain parts of relative to unique stance / gait etc._________________________________________
   _______________________________________________________________________
   /2 marks

b. Suggest other information that the police may be able to gain from the shoeprints.
   _____direction of travel, speed of travel from how far apart, other trace evidence, etc.__
   _______________________________________________________________________
   /2 marks

c. Use the graph in figure 7 above to work out a possible height for the person who made the prints.
   _____27 cm equates to height between 150 and 170 cm tall. _________________
   _______________________________________________________________________
   /2 marks

The heights of the three people who were in the building on the night of the crime are:

<table>
<thead>
<tr>
<th>Person</th>
<th>Height (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custodian</td>
<td>185</td>
</tr>
<tr>
<td>Dr Valdez</td>
<td>160</td>
</tr>
<tr>
<td>Dr Wang</td>
<td>178</td>
</tr>
</tbody>
</table>

d. Which of the above people is most likely responsible for making the shoe print?
   __________Dr Valdez is the only person in this height range ___________________
   _______________________________________________________________________
   /1 mark

4. From the evidence gained by your team in questions, complete the following table to see which of the suspects is most likely the perpetrator:

<table>
<thead>
<tr>
<th>Evidence type</th>
<th>Custodian</th>
<th>Dr Valdez</th>
<th>Dr Wang</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNA profiling</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Fingerprints</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>Shoe print</td>
<td>✗</td>
<td>✓</td>
<td>✗</td>
</tr>
</tbody>
</table>

a. The most likely perpetrator is: ____Dr Valdez __________
   /1 mark
5. Complete the following table for human bones:

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
</tr>
</thead>
<tbody>
<tr>
<td>cranium</td>
<td>Skull</td>
</tr>
<tr>
<td>mandible</td>
<td>Jaw (lower)</td>
</tr>
<tr>
<td>clavicle</td>
<td>Collar bone</td>
</tr>
<tr>
<td>scapula</td>
<td>Shoulder blade</td>
</tr>
<tr>
<td>sternum</td>
<td>Breast bone</td>
</tr>
<tr>
<td>humerus</td>
<td>(upper) arm bone</td>
</tr>
<tr>
<td>patella</td>
<td>Kneecap</td>
</tr>
<tr>
<td>tibia</td>
<td>Shin bone</td>
</tr>
</tbody>
</table>

Subtotal: _______ / 35 marks

Total: _______ / 70 marks

Reference List
http://www.pbs.org/wgbh/nova/education/body/create-dna-fingerprint.html
Heinemann eLearning 9 © Reed International Books Australia Pty Ltd
Task created by Kathy Harrison, Methodist Ladies’ College, 2014

NSW da Vinci
Decathlon
An academic gala day
for years 7 and 8

Code Breaking
Session 3

‘He who thinks little errs much...’ Leonard da Vinci.

Team Number ______________
Mystery and Mayhem!!!! (11 x 5 marks)

Hello fellow mystery fiends! Today’s challenge is mixed. I'm really looking forward to it! We must solve the mystery and there is mayhem as we play the alliteration game!

“What is that?” I hear you say.

It is simply the game where you have to alliterate your speech, clues, and solutions. The rules are simple: sentences simply sound similar. That is, the letter or sound at the start of most words is the same. Some words in a sentence may not alliterate but, fortunately, they are not the main words.

**Alliteration** is the repetition of the same sounds or of the same kinds of sounds at the beginning of words or in stressed syllables of an English language phrase. Alliteration developed largely through poetry, in which it more narrowly refers to the repetition of a consonant in any syllables that, according to the poem’s meter, are stressed.

So…. Let’s get started or you’ll never be finished!!!

Today, ten tantalizing teasers are there for your attention. Successfully solve them for incentive to spur you to subsequent solutions. A poem is presented. Find fundamental fresh fragments and finally, assert yourself to assist in the assembling.

Clues are contained in cryptic comments so concentrate.

1. 7464527 768637 263 538837 255483728466 273 548372559 5327464 263 7732474868759 78628828464 843 7373672833 72437 63 69 64733, 6833533 6463..

2. MKNMNPFRUUEU IMDTTOMRDUE, A IG ETL ASOFTR FNNE IAIN IEMS E IUOSYAKTEE LESN I IERMYAORTFUFOAFEKDUO MTCLU LMSSHRARAOFSFOMFVUIELFYLR LLCE FTN.

3. Primacy prods me to promote this prompt.

4. Look at the list for likely linguistics.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>BOVINE</td>
</tr>
<tr>
<td>IF</td>
<td>BET</td>
</tr>
<tr>
<td>INEPT</td>
<td>BERATE</td>
</tr>
<tr>
<td>EVOKE</td>
<td>GROW</td>
</tr>
<tr>
<td>ELUCIDATE</td>
<td>GABLE</td>
</tr>
<tr>
<td>ENFORCE</td>
<td>GAS</td>
</tr>
<tr>
<td>LIKE</td>
<td>TOGGLE</td>
</tr>
<tr>
<td>LAB</td>
<td>TEDIOUS</td>
</tr>
<tr>
<td>LABEL</td>
<td>TEDDY!</td>
</tr>
</tbody>
</table>

5. Careful with consonants contained, find its full form.

t cld b th clp rts cng ths cnstrtn r cts cmng nt th crpy crtrrs n. Crp!

6. Expose eight and everything encodes easily.

LWE’L EHAV UTOH ERRI HDLY EEAV WTIE EHol PHEA KING
NITA BDCA LOOD CEOF IARN OVOR AUSC NTsI CTOA ERAT

7. Rearrangement realigns realistic reason… right?

dan tifumage het grifnolkic nuf glinov kinficy slineef

8. So, six should succumb with this sequence.

9. The key is contained in the comments commencing this challenge.

Paragraphs produce partitions…..

4,4,1  2,1,9  6,1,9  7,3,4

10. Accolades for the author and his tantalizing title!
11. Lastly, look to your own learning. Create a code to challenge us. Alliteration of all, including clues, must be made, with a minimum of seven syllables.

   a. Your coded message:

   

   b. Decoded message:

   

   c. Explanation of your code:
Code Breaking Answers:  Team Number: _______________

<table>
<thead>
<tr>
<th>Code</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>• Fill in on previous page</td>
</tr>
</tbody>
</table>
NSW da Vinci Decathlon

An academic gala day for years 7 and 8

Code Breaking Answers

Session 3

‘He who thinks little errs much...’ Leonard da Vinci.

Team Number

_______________
Hello fellow mystery fiends! Today’s challenge is mixed. I’m really looking forward to it! We must solve the mystery and there is mayhem as we play the alliteration game!

“What is that?” I hear you say.

It is simply the game where you have to alliterate your speech, clues, and solutions. The rules are simple: sentences simply sound similar. That is, the letter or sound at the start of most words is the same. Some words in a sentence may not alliterate but, fortunately, they are not the main words.

**Alliteration** is the repetition of the same sounds or of the same kinds of sounds at the beginning of words or in stressed syllables of an English language phrase. Alliteration developed largely through poetry, in which it more narrowly refers to the repetition of a consonant in any syllables that, according to the poem’s meter, are stressed.

So…. Let’s get started or you’ll never be finished!!!

Today, ten tantalizing teasers are there for your attention. Successfully solve them for incentive to spur you to subsequent solutions. A poem is presented. Find fundamental fresh fragments and finally, assert yourself to assist in the assembling.

Clues are contained in cryptic comments so concentrate.

1. 7464527 768637 263 538837 255483728466 273 548372559 5327464 263 7732474868759 78628828464 843 7373672833 72437 63 69 64733, 6833533 6463..

2. MKMNAMPFRUUEU IMDTTOMRDUE,  A IG ETL ASOFTR FNNE IA IN IEMS  E IUOSYAKTEE LESN I IERMYAORTFUFOAFEKDUO  MTCLU LMSSHRARAOSRSFOMFVUIELFYLR LLCE FTN.

3. Primacy prods me to promote this prompt.


4. Look at the list for likely linguistics.

<table>
<thead>
<tr>
<th>I</th>
<th>BOVINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>IF</td>
<td>BET</td>
</tr>
<tr>
<td>INEPT</td>
<td>BERATE</td>
</tr>
<tr>
<td>EVOKE</td>
<td>GROW</td>
</tr>
<tr>
<td>ELUCIDATE</td>
<td>GABLE</td>
</tr>
<tr>
<td>ENFORCE</td>
<td>GAS</td>
</tr>
<tr>
<td>LIKE</td>
<td>TOGGLE</td>
</tr>
<tr>
<td>LAB</td>
<td>TEDIOUS</td>
</tr>
<tr>
<td>LABEL</td>
<td>TEDDY !</td>
</tr>
</tbody>
</table>

5. t cl d b th clp rts csng ths cnstrtn r cts cmng nt th crrdr cnstntly crryng th crpy 
crttrs n. Crp!

6. Expose eight and everything encodes easily.

LWE’L EHAV UTOH ERR! HDLY EEAV WTHE EHOL PHEA KING 
NITA BDCA LOOD CEOF IARN OVOR AUSC NTSI CTOA ERAT

7. Rearrangement realigns realistic reason… right?!

dan tifumage het grifnolkic nuf glinov kinficy slineef

8. So, six should succumb with this sequence.

9. The key is contained in the comments commencing this challenge. 
Paragraphs produce partitions…..

   4,4,1   2,1,9   6,1,9   7,3,4

10. Accolades for the author and his tantalizing title!

Uorkkrm’ Rmuvhgzgrlm Zoorgvizgrlm Yb  Ilyvig Wfuivhmv

11. Lastly, look to your own learnings. Create a code to challenge us. Alliteration 
of all, including clues, must be made, with a minimum of seven syllables.

   a. Your coded message:
b. Decoded message:

c. Explanation of your code:
<table>
<thead>
<tr>
<th>Code</th>
<th>Answer</th>
</tr>
</thead>
</table>
| 1    | Similar sounds and letter alliteration are literally leaping and precipitously punctuating the perforated pages of my mired, muddled mind..  
(phone code) |
| 2    | Making mental maps for future fun in meditation mired muse, meticulously masks the real reasons I rise from my favourite fluffy floral flecked futon.  
(rail fence cipher) |
| 3    | It seems somehow strange but my favourite finely fitted floral flecked futon is infested full of flippin’ fleas.  
(substitution cipher – prime numbers, a=2, b=3, c=5...) |
| 4    | I feel flabbergasted!  
(first letter of first word, second letter of second, third letter of third, first of fourth, second of fifth....) |
| 5    | It could be the culprits causing this consternation are cats coming into the corridor constantly carrying the creepy critters in. Crap!  
(missing vowels) |
| 6    | We’ll have to hurriedly heave the whole heaping kit and caboodle of carnivorous cats into a crate  
(key cipher with ‘fine’ as the key) |
| 7    | and fumigate the frolicking fun loving finicky felines.  
(anagrams) |
| 8    | Fine!  
(binary) |
| 9    | Fortunately, I’m finished........finally.  
(paragraph number, line number, word number) |
| 10   | Flippin’ Infestation Alliteration By Robert Dufresne  
(shift cipher, backwards alphabet a =z, b = y ) |
| 11   | • Two marks for the correctly encoded message which alliterates, one mark if it doesn’t alliterate  
• One mark for decoded message – it must alliterate and be at least 7 syllables long  
• 3 marks for a clear explanation of how the message was encoded, 2 marks if only a key provided.... |
“Why does the eye see a thing more clearly in dreams than the imagination when awake?”
(Leonardo da Vinci)
Task: Through the Looking Glass

Background Information:

‘There is a place. Like place no place on earth. A land full of wonder, mystery and danger!’ Alice in Wonderland.

In the sequel to Alice in Wonderland, Alice steps through the looking glass of her imagination into a strange, chaotic and magical world where she encounters unusual creatures such as the Red Queen, Humpty Dumpty, a lion and unicorn.

How could you use the looking glass symbolically in a poem and artwork to convey mystery and mayhem?

Your Task

You have to use the motif of the looking glass in an integrated artwork and poem. The artwork must be a combination of a 3D model and drawings. The poem must reflect the notion of the looking glass and inter-weave mystery and mayhem.

You must include the following in your poem:

- Symbolic use of the looking glass
- A metaphor
- Alliteration
- Onomatopoeia

Materials:
2 A4 sheets of paper
1 sheet of A4 cardboard
Own pencils and texts
Sticky tape can be used

Marking Criteria

<table>
<thead>
<tr>
<th></th>
<th>Poem</th>
<th>Art</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creative interpretation of the task</td>
<td>/5</td>
<td>/5</td>
</tr>
<tr>
<td>The interconnectedness of the poetry and the artwork</td>
<td></td>
<td>/5</td>
</tr>
<tr>
<td>The message conveyed re mystery and mayhem</td>
<td></td>
<td>/5</td>
</tr>
<tr>
<td>Symbolism</td>
<td></td>
<td>2 marks</td>
</tr>
<tr>
<td>Alliteration, metaphor &amp; onomatopoeia</td>
<td></td>
<td>1 mark each</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>/25</td>
</tr>
</tbody>
</table>
NSW da Vinci Decathlon

An academic gala day for years 7 and 8

Engineering

Session 2

‘Simplicity is the ultimate sophistication’ Leonardo da Vinci.

Team Number ____________
Engineering Challenge

Challenge

Your team’s challenge is to design an innovative skyscraper that consists of two towers connected by a walkway. When the Petronas Tower in Malaysia was constructed in 1998 it was hailed as one of the most innovative and creative buildings ever conceived. Your design can be inspired by this tower, but the design must be original and aesthetically pleasing. The added challenge is that the two towers must be joined by a walkway and the entire structure must be free standing and not collapse.

Design Constraints/Limitations

Materials limitation:

You are provided with the following materials but you do not have to use all of the materials.

- 2 sheets of white A4 paper to construct the walkway but you can use straws as well
- 50 straws

You can use sticky tape but do not overuse it or the aesthetic design will be compromised.

Innovation:

You have to apply innovative design ideas to construct twin towers that are capable of being free standing and support a walkway. The towers MUST be made out of the straws and the structure will receive ZERO if it is not stable and free standing. The walkway can be made out of paper and straws.

Time: 45 minutes

Testing conditions:

Your design will have to remain freestanding. You will receive extra marks for the span of the walkway that must be a minimum of 20cms in length. TWO marks for every ONE centimetre OVER 20cms.

Marking Criteria

You will be marked on the basis of the following criteria:

1. Innovative and aesthetically pleasing design /10
2. Stability test - ZERO if it is not stable and freestanding
3. Design brief /10
4. Length of walkway over 20cm + .5
### Marking Grid

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Skilful</th>
<th>Effective</th>
<th>Sound</th>
<th>Limited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovative and aesthetically pleasing design</td>
<td>9-10</td>
<td>8-7</td>
<td>6-4</td>
<td>3-0</td>
</tr>
<tr>
<td>Design brief</td>
<td>9-10</td>
<td>8-7</td>
<td>6-4</td>
<td>3-0</td>
</tr>
<tr>
<td>Length of walkway over 20cm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Team Number** _____________

**Design Brief**

Explain why your design is unique:

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

**TOTAL**
NSW da Vinci
Decathlon

An academic gala day
for years 7 and 8

General Knowledge

Session 3

‘The knowledge of all things is possible’ Leonardo da Vinci.

Team Number

______________
### Mysterious Places (10 marks)

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The Nazca Lines and huge geoglyphs which are so big that they can only be recognised from a great height. They were created nearly 2,000 years ago. Which country are they found?</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>This chunk of rock solved one of the great mysteries of the ancient world, Egyptian Hieroglyphs.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>These strange Moai statues of human heads that have puzzled people for centuries are found where?</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>This mystic site features huge stones. Name the place where these stones are found.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>These giant structures that housed Pharaohs are found in what city?</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>In this place you can find the stone spheres 'Las Bolas'.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>This famous mountain was the setting for an Australian film about a mysterious picnic.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Planes and ships have disappeared in this infamous place.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>This famous naval city was said to have disappeared in one day.</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>This giant white horse said to have been created in the Iron Age is located in what place in England?</td>
<td></td>
</tr>
</tbody>
</table>

### Mysterious Events and Sightings (5 marks)

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>This ship was found floating at sea in 1872 with no crew.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>In 1908 a blazing fireball descended from the sky and devastated a large area of forest. Where did this occur?</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>What is the Indian name for the mysterious Gigantopithecus blacki – a supersize ape – sighted in America?</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>What is said to have happened at Roswell in 1947?</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>A famous sea serpent is said to live here?</td>
<td></td>
</tr>
</tbody>
</table>

### Mystery and Mayhem Songs (5 marks)

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>A Beatle Album about a tour</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Little Jackie Piper grows up and forgets his mysterious friend.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>This famous Australian war song was about the mental chaos caused by the Vietnam War.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>This song by Muse is about the chaos that can erupt because of government control.</td>
<td></td>
</tr>
</tbody>
</table>
This song by Sheppard is full of destruction and chaos.

### Mysterious People

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The name given to the mysterious prisoner held in a number of Jails (including the Bastille) during the reign of King Louis XIV of France.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>This famous Russian was rumoured to have had supernatural powers.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>The Prince of Wallachia’s father was from the order of the dragon. What is the Prince’s famous nickname?</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>This man terrified people in Whitechapel.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>This King had a legendary sword with magic powers.</td>
<td></td>
</tr>
</tbody>
</table>

### Renaissance Questions

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The mystery that surrounds this da Vinci famous portrait continues to intrigue people.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>What was da Vinci’s mysterious writing technique?</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>In which modern computer games is da Vinci the close confidant of Ezio?</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>This famous da Vinci painting has mysteriously been painted twice by da Vinci.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Da Vinci was also famous for his codes. He is as a result referred to as a?</td>
<td></td>
</tr>
</tbody>
</table>

### Recent Events 2014

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>What was the first city in the world to get its name as a dot (name) in a URL? ie www.daVinciDecathlon.city_name</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>What was the name of the cyclone that hit Vanuatu and travelled south to threaten New Zealand?</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>What colour is the black box that is being sought following the disappearance of flight MH370?</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Causing one in eight global deaths, what has the World Health Organisation (WHO) identified as the world’s biggest environmental health risk?</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>When was Earth Hour 2014?</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Where has there been an outbreak of the ebola virus in March/ April 2014?</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>What is the name of Internet connected glasses that allow</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Question</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>you to see computer output in your field of vision?</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Which province did Russia recently take over?</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>What is the term that aviation experts use to refer to what is commonly known as a black box?</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>According to the Preservation of Ugly Animals Society, there are three candidates for the ugliest animal on earth—name one of them.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>The shell of which nut burns at very high temperature and is being used to replace coal and charcoal in agribusinesses in Queensland?</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Which country was the first to make the black box compulsory in aircraft?</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>According to recent social research, what fraction of ‘children’ are still living at home in Australia when they turn 30?</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Which titles did Tony Abbott reintroduce on 25/3/14?</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Who was the president of Egypt, deposed in July 2013?</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>When was analogue TV finally switched off in Australia?</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>What is the name of the latest baby born to the British royal family?</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>In submissions to the Fair Work Commission's annual wage review, the case has been made to raise the minimum wage by $27 per week. What is the minimum wage rate for workers in Australia not covered by an award?</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>What date is the unofficial ‘Star Wars Day’ that has prompted cinemas to schedule Star Wars marathon screenings around Australia?</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Which biblical epic story is featured in a recently released movie?</td>
<td></td>
</tr>
</tbody>
</table>
NSW da Vinci Decathlon

An academic gala day for years 7 and 8

General Knowledge Answers

Session 3

‘The knowledge of all things is possible’ Leonardo da Vinci.

Team Number _______________
### Mysterious Places (10 marks)

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The Nazca Lines and huge geoglyphs which are so big that they can only be recognised from a great height. They were created nearly 2,000 years ago. Which country are they found?</td>
<td>Peru (Ica)</td>
</tr>
<tr>
<td>2.</td>
<td>This chunk of rock solved one of the great mysteries of the ancient world, Egyptian Hieroglyphs.</td>
<td>Rosetta Stone</td>
</tr>
<tr>
<td>3.</td>
<td>These strange Moai statues of human heads that have puzzled people for centuries are found where?</td>
<td>Easter Island</td>
</tr>
<tr>
<td>4.</td>
<td>This mystic site features huge stones. Name the place where these stones are found.</td>
<td>Wiltshire, England</td>
</tr>
<tr>
<td>5.</td>
<td>These giant structures that housed Pharaohs are found in what city?</td>
<td>Giza</td>
</tr>
<tr>
<td>6.</td>
<td>In this place you can find the stone spheres 'Las Bolas'.</td>
<td>Costa Rica</td>
</tr>
<tr>
<td>7.</td>
<td>This famous mountain was the setting for an Australian film about a mysterious picnic.</td>
<td>Hanging Rock</td>
</tr>
<tr>
<td>8.</td>
<td>Planes and ships have disappeared in this infamous place.</td>
<td>Bermuda Triangle</td>
</tr>
<tr>
<td>9.</td>
<td>This famous naval city was said to have disappeared in one day.</td>
<td>Atlantis</td>
</tr>
<tr>
<td>10.</td>
<td>This giant white horse said to have been created in the Iron Age is located in what place in England?</td>
<td>Huffington</td>
</tr>
</tbody>
</table>

### Mysterious Events and Sightings (5 marks)

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>This ship was found floating at sea in 1872 with no crew.</td>
<td>Mary Celeste</td>
</tr>
<tr>
<td>2.</td>
<td>In 1908 a blazing fireball descended from the sky and devastated a large area of forest. Where did this occur?</td>
<td>Siberia</td>
</tr>
<tr>
<td>3.</td>
<td>What is the Indian name for the mysterious Gigantopithecus blacki – a supersize ape – sighted in America?</td>
<td>Sasquatch</td>
</tr>
<tr>
<td>4.</td>
<td>What is said to have happened at Roswell in 1947?</td>
<td>UFO crash</td>
</tr>
<tr>
<td>5.</td>
<td>A famous sea serpent is said to live here?</td>
<td>Loch Ness</td>
</tr>
</tbody>
</table>

### Mystery and Mayhem Songs (5 marks)

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>A Beatle Album about a tour</td>
<td>Magical Mystery Tour</td>
</tr>
<tr>
<td>2.</td>
<td>Little Jackie Piper grows up and forgets his mysterious friend.</td>
<td>Puff the Magic Dragon</td>
</tr>
<tr>
<td>3.</td>
<td>This famous Australian war song was about the mental chaos caused by the Vietnam War.</td>
<td>Only 19</td>
</tr>
<tr>
<td>4.</td>
<td>This song by Muse is about the chaos that can erupt because of government control.</td>
<td>Uprising</td>
</tr>
</tbody>
</table>
5. This song by Sheppard is full of destruction and chaos. Geronimo

Mysterious People

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The name given to the mysterious prisoner held in a number of Jails (including the Bastille) during the reign of King Louis XIV of France.</td>
<td>The Man in the Iron Mask</td>
</tr>
<tr>
<td>2.</td>
<td>This famous Russian was rumoured to have had supernatural powers.</td>
<td>Rasputin</td>
</tr>
<tr>
<td>3.</td>
<td>The Prince of Wallachia’s father was from the order of the dragon. What is the Prince’s famous nickname?</td>
<td>Dracula</td>
</tr>
<tr>
<td>4.</td>
<td>This man terrified people in Whitechapel.</td>
<td>Jack the Ripper</td>
</tr>
<tr>
<td>5.</td>
<td>This King had a legendary sword with magic powers.</td>
<td>King Arthur</td>
</tr>
</tbody>
</table>

Renaissance Questions

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The mystery that surrounds this da Vinci famous portrait continues to intrigue people.</td>
<td>Mona Lisa</td>
</tr>
<tr>
<td>2.</td>
<td>What was da Vinci’s mysterious writing technique?</td>
<td>A mirror writing technique; that is, he wrote going from right to left</td>
</tr>
<tr>
<td>3.</td>
<td>In which modern computer games is da Vinci the close confidant of Ezio?</td>
<td>Assassin’s Creed II</td>
</tr>
<tr>
<td>4.</td>
<td>This famous da Vinci painting has mysteriously been painted twice by da Vinci.</td>
<td>Madonna of the Rocks</td>
</tr>
<tr>
<td>5.</td>
<td>Da Vinci was also famous for his codes. He is as a result referred to as a?</td>
<td>cryptographer</td>
</tr>
</tbody>
</table>

Recent Events 2014

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>What was the first city in the world to get its name as a dot (name) in a URL? ie www.daVinciDecathlon.city_name</td>
<td>Berlin</td>
</tr>
<tr>
<td>2.</td>
<td>What was the name of the cyclone that hit Vanuatu and travelled south to threaten New Zealand?</td>
<td>Lusi</td>
</tr>
<tr>
<td>3.</td>
<td>What colour is the black box that is being sought following the disappearance of flight MH370?</td>
<td>orange</td>
</tr>
<tr>
<td>4.</td>
<td>Causing one in eight global deaths, what has the World Health Organisation (WHO) identified as the world’s biggest environmental health risk?</td>
<td>Air pollution</td>
</tr>
<tr>
<td>5.</td>
<td>When was Earth Hour 2014?</td>
<td>29th March, 8.30-9.30pm</td>
</tr>
<tr>
<td>6.</td>
<td>Where has there been an outbreak of the ebola virus in March/ April 2014?</td>
<td>Guinea</td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>What is the name of Internet connected glasses that allow you to see computer output in your field of vision?</td>
<td>google glass</td>
<td></td>
</tr>
<tr>
<td>Which province did Russia recently take over?</td>
<td>Crimea</td>
<td></td>
</tr>
<tr>
<td>What is the term that aviation experts use to refer to what is commonly known as a black box?</td>
<td>electronic flight data recorder</td>
<td></td>
</tr>
<tr>
<td>According to the Preservation of Ugly Animals Society, there are three candidates for the ugliest animal on earth—name one of them.</td>
<td>BLOBFISH, AXOLOTL AND PROBOSCIS MONKEY</td>
<td></td>
</tr>
<tr>
<td>The shell of which nut burns at very high temperature and is being used to replace coal and charcoal in agribusinesses in Queensland?</td>
<td>macadamia</td>
<td></td>
</tr>
<tr>
<td>Which country was the first to make the black box compulsory in aircraft?</td>
<td>Australia</td>
<td></td>
</tr>
<tr>
<td>According to recent social research, what fraction of ‘children’ are still living at home in Australia when they turn 30?</td>
<td>1/12</td>
<td></td>
</tr>
<tr>
<td>Which titles did Tony Abbott reintroduce on 25/3/14?</td>
<td>Knights and dames</td>
<td></td>
</tr>
<tr>
<td>Who was the president of Egypt, deposed in July 2013?</td>
<td>Mohammed Morsi</td>
<td></td>
</tr>
<tr>
<td>When was analogue TV finally switched off in Australia?</td>
<td>10 December, 2013 (Melbourne and central eastern Australia)</td>
<td></td>
</tr>
<tr>
<td>What is the name of the latest baby born to the British royal family?</td>
<td>George Alexander Louis</td>
<td></td>
</tr>
<tr>
<td>In submissions to the Fair Work Commission's annual wage review, the case has been made to raise the minimum wage by $27 per week. What is the minimum wage rate for workers in Australia not covered by an award?</td>
<td>$622.20 per week or $16.37 per hour ($620/ week or $16/ hour is close enough)</td>
<td></td>
</tr>
<tr>
<td>What date is the unofficial ‘Star Wars Day’ that has prompted cinemas to schedule Star Wars marathon screenings around Australia?</td>
<td>May the 4th (be with you)</td>
<td></td>
</tr>
<tr>
<td>Which biblical epic story is featured in a recently released movie?</td>
<td>Noah or Noah’s Ark</td>
<td></td>
</tr>
</tbody>
</table>