High School Mathematics Test 2015

Year 7

2D and 3D Shapes

Non Calculator Section

Name_____

Skills and Knowledge Assessed:

- Name and list properties of common two dimensional shapes.
- Connect three dimensional objects with their nets and other two-dimensional representations (ACMMG111)
- Construct simple prisms and pyramids (ACMMG140)
- Classify triangles according to their side and angle properties and describe quadrilaterals (ACMMG165)

Answer all questions in the spaces provided on this test paper by:

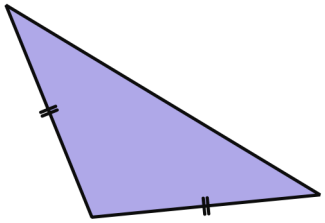
Writing the answer in the box provided.

or

Shading in the bubble for the correct answer from the four choices provided.

Show any working out on the test paper. Calculators are **not** allowed.

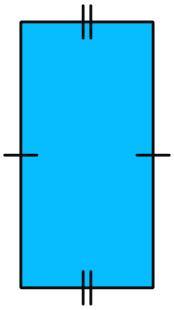
1. What name could describe the triangle shown?



- ☐ Equilateral triangle
- ☐ Isosceles triangle
- ☐ Right triangle
- ☐ Scalene Triangle

2. Jessica draws a rhombus and marks any equal sides on her drawing.

Which could be her drawing?



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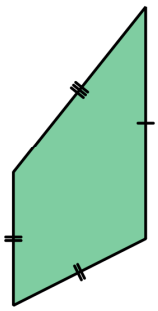

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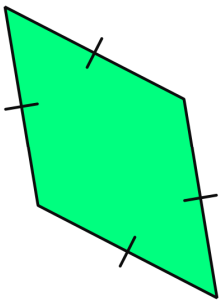

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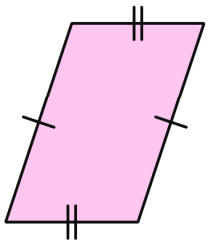
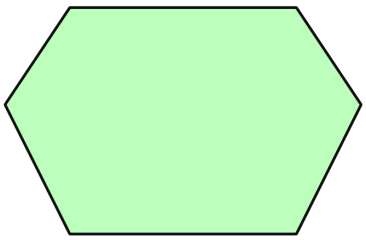
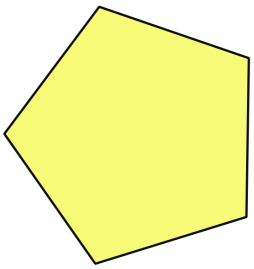


☐

3. Draw in all the diagonals of the polygon below.

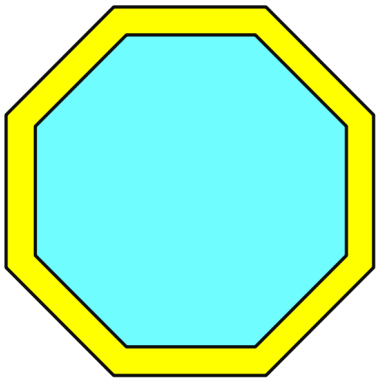


4. Which is an accurate description of the shape shown?

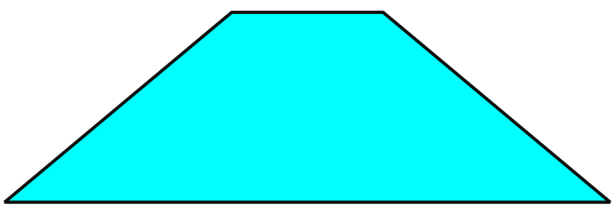


- ☐ An irregular hexagon.
- ☐ An irregular pentagon.
- ☐ A regular hexagon.
- ☐ A regular pentagon.

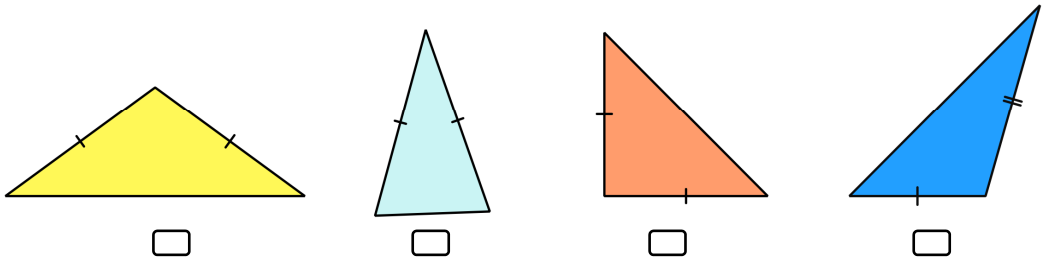
5. Draw in all the axes of line symmetry in this shape.



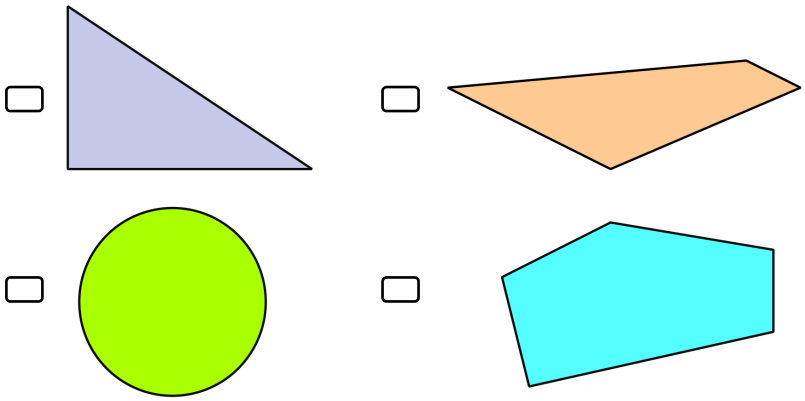
6. Mark which sides are equal and which sides are parallel on this diagram of a trapezium. You can use a ruler.



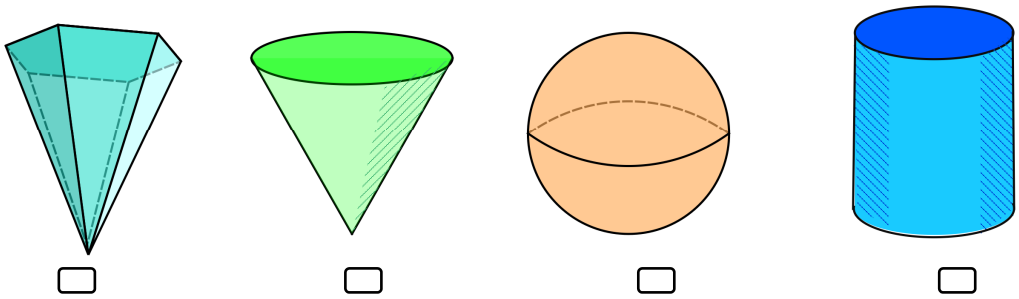
7. Which diagram shows an obtuse isosceles triangle?



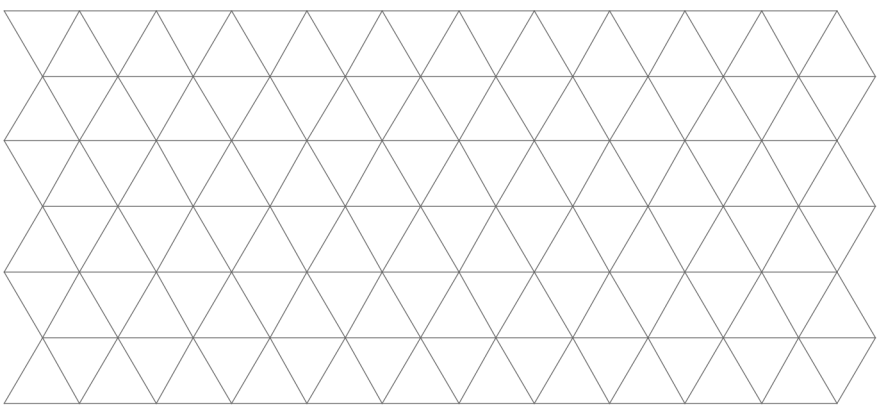
8. Which shape below is a quadrilateral?



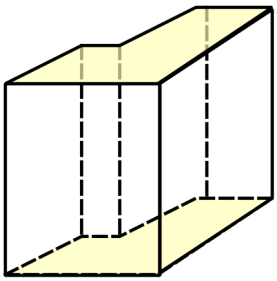
9. Which of the solids is a cylinder?



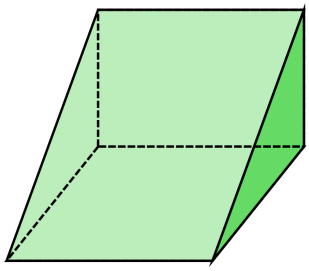
10. Use the grid to help you to draw a 3D representation of a hexagonal prism.



11. How many edges are there on this solid?

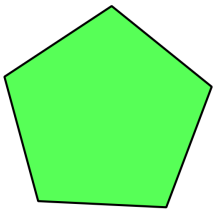


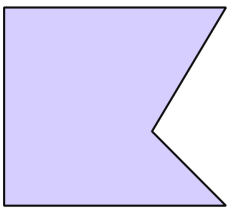
12. How many vertices are there on this solid?

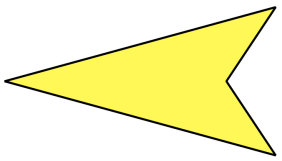


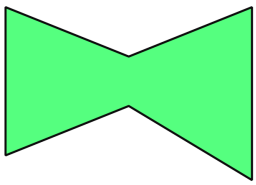
☐ 5 ☐ 6 ☐ 8 ☐ 9

13. Which shape below is a convex polygon?

☐ 

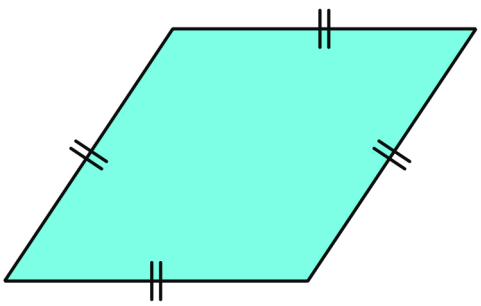
☐ 

☐ 

☐ 

14. Which of these words could **not** be used to classify the shape shown?

☐ Parallelogram.
☐ Quadrilateral
☐ Rhombus.
☐ Square

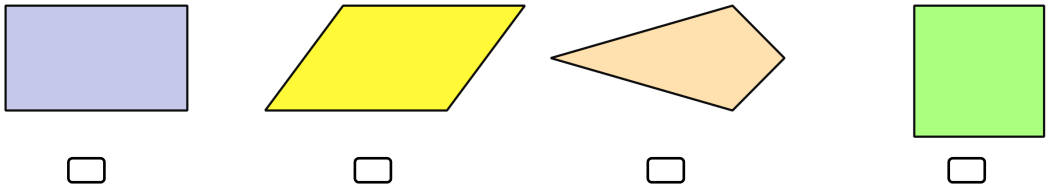


15. Two students make accurate comments about a shape.

Simon : *The shape has rotational symmetry of order 2.*

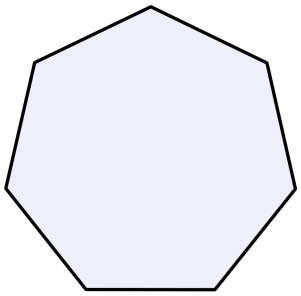
Damien : *The shape has diagonals which are equal in length.*

Which was the shape they were commenting on?



☐ ☐ ☐ ☐

16. Draw in all the diagonals on the shape shown and complete the statement below.



The shape has ☐ sides and there are ☐ diagonals in this shape.

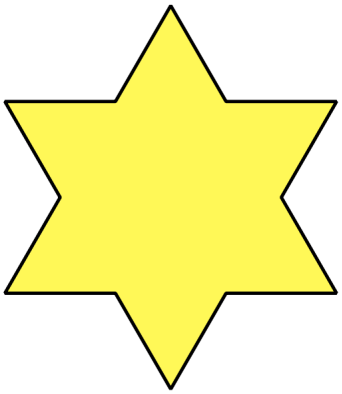
17. Describe the types of symmetry the shape shown below displays. You may draw on the diagram to illustrate your answer.

_____

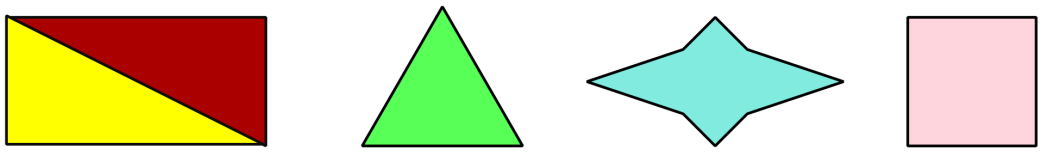
_____

_____

_____

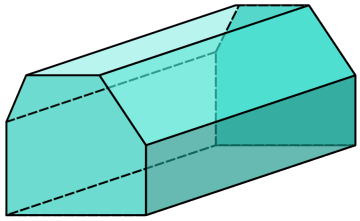


18. Which shape below has rotational symmetry of order 2?



☐ ☐ ☐ ☐

19. What is the name of the solid shown below?



20. Sketch and name a solid which has exactly six faces, all of which are rectangles.

Sketch Name

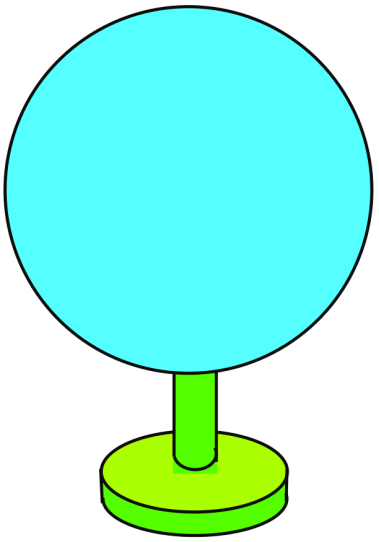
21. Which of the following solids has exactly 5 faces and 9 edges?

☐ A cube. ☐ A square pyramid.

☐ A triangular prism. ☐ A triangular pyramid.

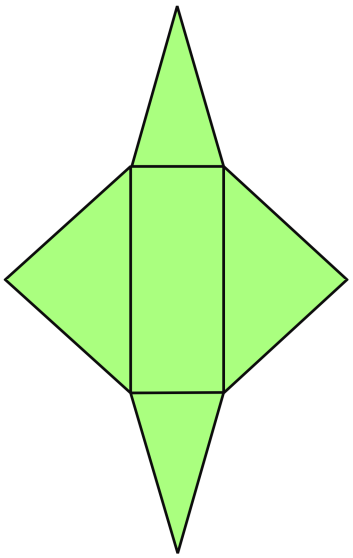
22. The lamp consists of a sphere and two cylinders.

Which two views would be exactly the same?

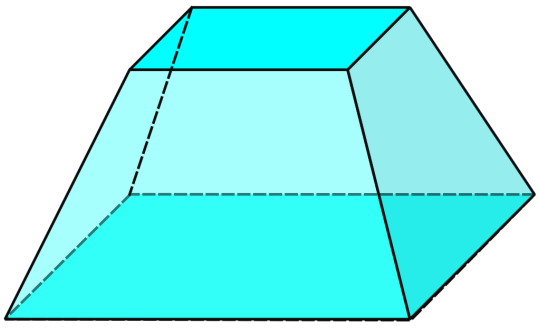


- ☐ The front view and top view.
- ☐ The front view and side view.
- ☐ The side view and top view.
- ☐ The top view and bottom view.

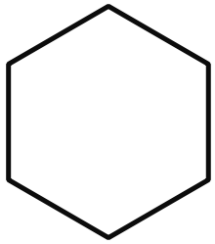
23. Draw a 3D sketch of the solid whose net is shown.



24. Draw the top view (plan) of the solid shown.



25. When the opposite vertices of a regular hexagon are joined, a number of triangles are formed.
Which is true?



- ☐ There are six equilateral triangles formed.
- ☐ There are nine equilateral triangles formed.
- ☐ There are six isosceles triangles formed.
- ☐ There are nine isosceles triangles formed.

26. Sketch a polygon which has three axes of line symmetry and rotational symmetry of order 3.

27. Caroline is investigating a quadrilateral and makes some measurements.
She finds that the first diagonal bisects the second but not vice versa.
The diagonals measure 18 cm and 9 cm in length and intersect at an angle of 90^{o}.
Which type of quadrilateral is she investigating?

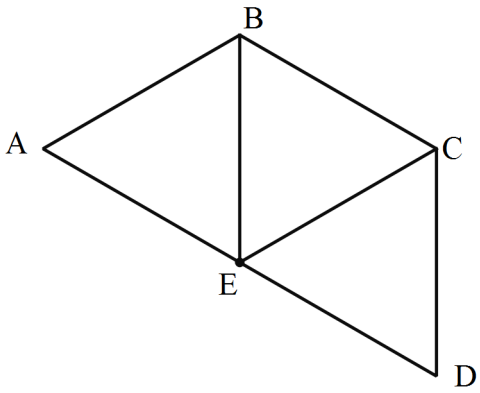
☐ A kite ☐ A rectangle. ☐ A rhombus. ☐ A square.

28. A quadrilateral has unequal diagonals which bisect the angles of the quadrilateral and which intersect at right angles.

Sketch and name the quadrilateral.

Sketch Name

29. James draws the trapezium ABCD shown below, which is made up of three equilateral triangles.



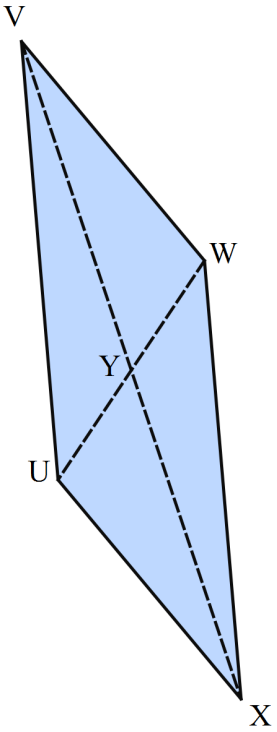
Name an isosceles triangle that could be drawn by joining three of the labelled points on the trapezium.

Δ ☐

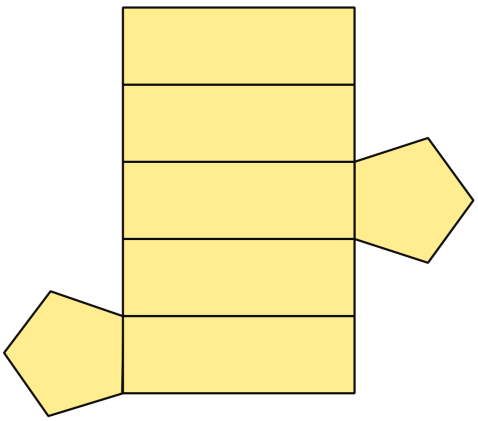
30. Jonas has started to fill in a table that summarises the properties of the quadrilateral shown.

Complete the table.

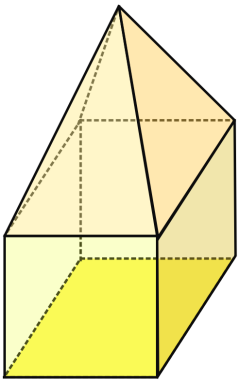
Property	
Are opposite angles equal?	Yes, two pairs are equal.
Are the diagonals equal?	No
Are opposite sides equal?	
Are adjacent sides equal?	
Do the diagonals intersect at right angles?	
Do the diagonals bisect one another?	



31. What name would be given to the solid formed from the net shown?



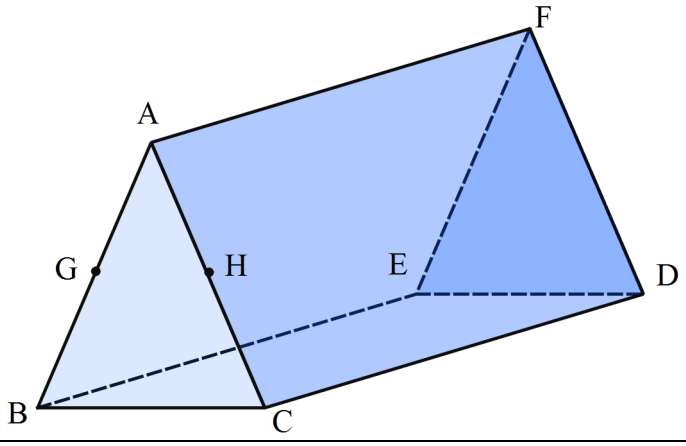
32. How many faces and vertices are there on this solid?



- ☐ 7 faces and 8 vertices.
- ☐ 8 faces and 9 vertices.
- ☐ 9 faces and 8 vertices.
- ☐ 9 faces and 9 vertices.

33. The points G and H are the midpoints of AB and AC respectively on the solid.
A cut is made in the plane formed by the points GHDE.

Draw and label a sketch of the cut face so formed.



34. Sketch a net that could be folded to form a cone.

High School Mathematics Test 2015

Year 7

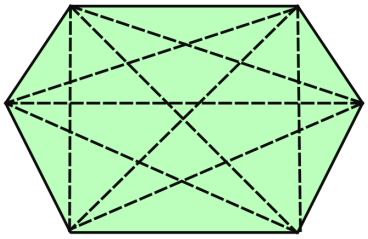
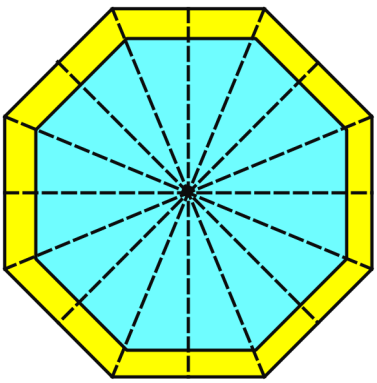
2D and 3D Shapes

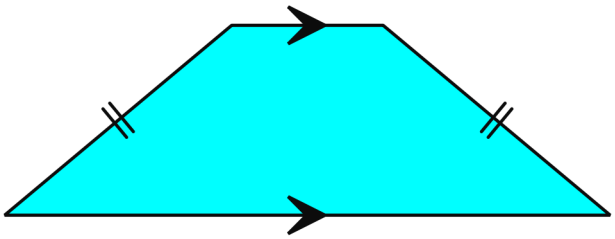
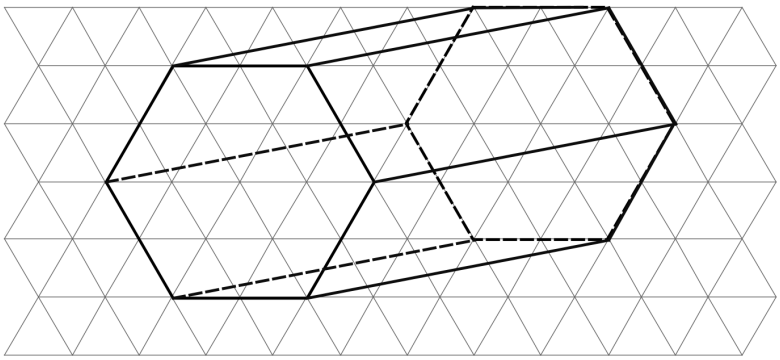
Non Calculator Section

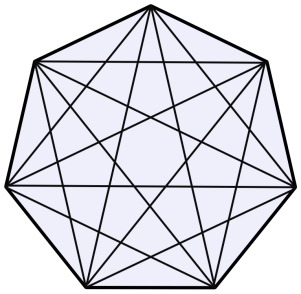
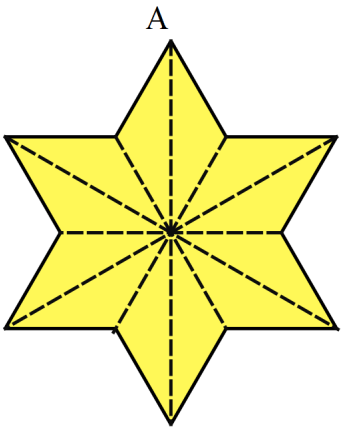
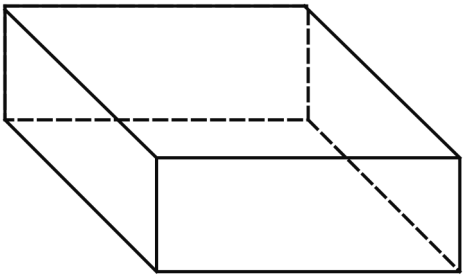
ANSWERS

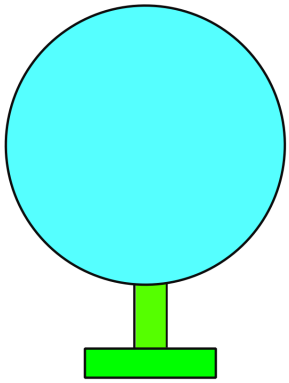
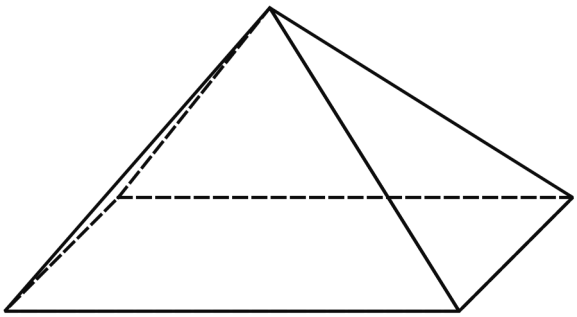
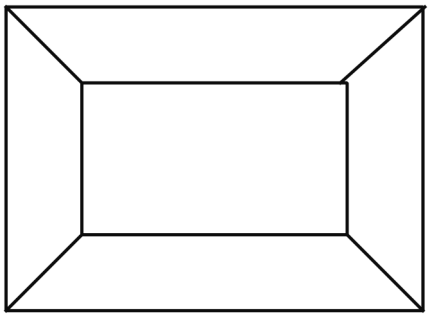
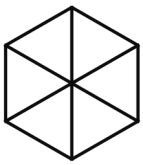
If answers are arranged in two rows, the numbering is as follows for the purpose of describing the answer.

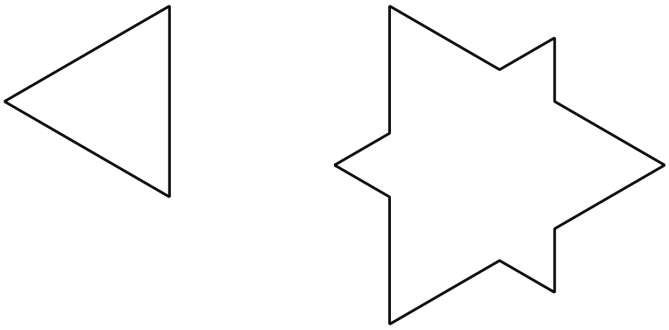
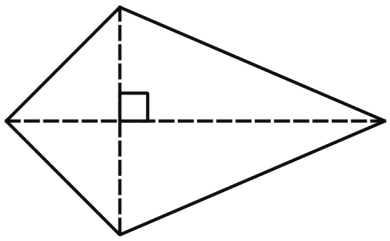
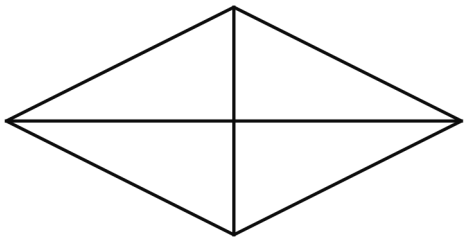
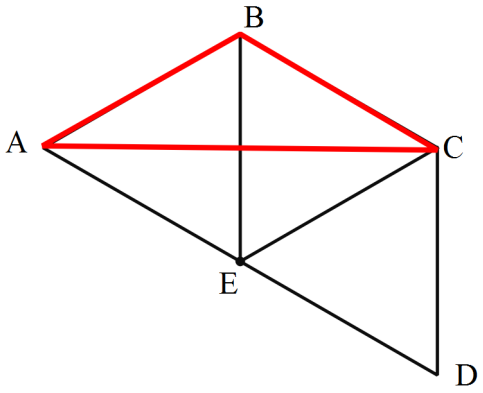
1 2
3 4

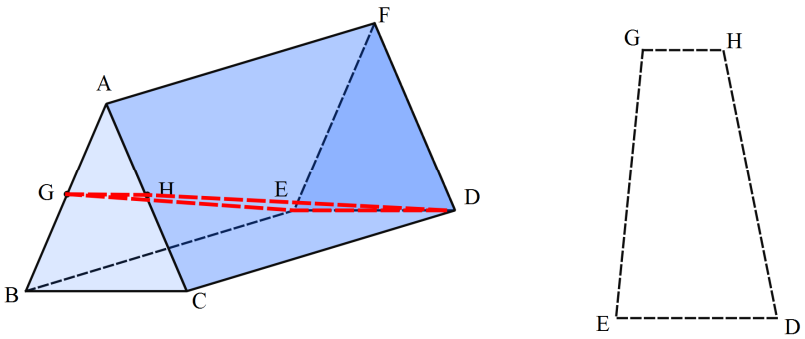
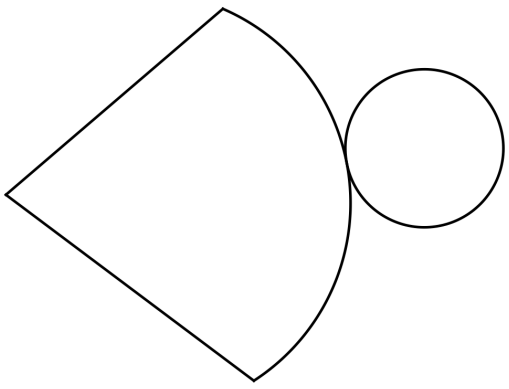
No.	WORKING	ANSWER
1.	2 sides equal so isosceles	2nd Answer
2.	Rhombus has 4equal sides	3rd answer
3.		See diagram
4.	All 5 sides are equal and all angles are equal, so regular pentagon.	4th Answer
5.		See diagram

6.		See diagram ½ for parallel markings ½ for equal markings
7.	The first 3 are isosceles, and the first has an obtuse angle.	1st answer
8.	Quadrilateral has 4 sides.	2nd answer
9.	Cylinder has 2 circular ends joined by a curved face.	4th Answer
10.	Hexagonal prism. 	See diagram Any shape of hexagon is okay, doesn't have to be regular as shown.
11.	There are 6 edges at each end and a further 6 joining the ends.	18
12.	3 at each end, so 6 altogether.	2nd answer
13.	All diagonals lie inside the figure for a convex polygon.	1st answer
14.	It is not a square as it does not have a right angle between the edges.	4th answer
15.	Only the rectangle has both properties	1st answer

16.	Draw in all the diagonals on the shape shown and complete the statement below.  The shape has [7] sides and there are [14] diagonals in this shape.	
17.	There are 6 axes of line symmetry, as shown. It has rotational symmetry of order 6 as each point of the star can be rotated to the point A, and it still looks the same. 	
18.	The first has order 1, due to the different shading. The second has order 3 The third has order 2 The fourth has order 4	3rd answer
19.	It is a prism as the two ends are the same, joined by rectangles. The end has 6 edges, which are not equal, so it is an irregular hexagon	Irregular hexagonal prism
20.	 Rectangular Prism	See diagram Any rectangular prism
21.	A triangular prism has 5 faces and 9 edges	3rd answer

22.	The front and side views would be the same. 	2nd answer
23.		See diagram
24.		See diagram
25.	There are 6 equilateral triangles 	1st answer

26.	An equilateral triangle is the simplest, but others are possible for example the polygon shown. 	See diagram
27.	The figure is as shown. So it is a kite. 	1st answer
28.	The shape is a rhombus. 	Rhombus See Diagram
29.	Example 	Any of Δ ABC, Δ ACE, Δ BED or Δ BCD

<table>
<tr><td>30.</td><td>
<table>
<tr><td>Property</td><td></td></tr>
<tr><td>Are opposite angles equal?</td><td>Yes, two pairs are equal.</td></tr>
<tr><td>Are the diagonals equal?</td><td>No</td></tr>
<tr><td>Are opposite sides equal?</td><td>Yes</td></tr>
<tr><td>Are adjacent sides equal?</td><td>No</td></tr>
<tr><td>Do the diagonals intersect at right angles?</td><td>No</td></tr>
<tr><td>Do the diagonals bisect one another?</td><td>Yes</td></tr>
</table>
</td><td>See table</td></tr>
<tr><td>31.</td><td>Pentagonal Prism</td><td></td></tr>
<tr><td>32.</td><td>There are 9 faces and 9 vertices</td><td>4th Answer</td></tr>
<tr><td>33.</td><td> 
</td><td>Any trapezium, see diagram</td></tr>
<tr><td>34.</td><td>  </td><td>See diagram</td></tr>
</table>