Ampleforth College

Year 9 entry – Middle School Academic Scholarship

Mathematics Paper

SPECIMEN PAPER
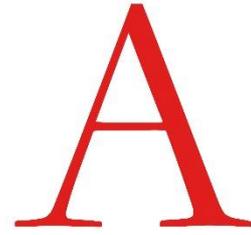
Duration: 1 hour

You may use a calculator. You must show your working out in each question.

Answer ALL questions.

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1. This question is about the triangle PQR.
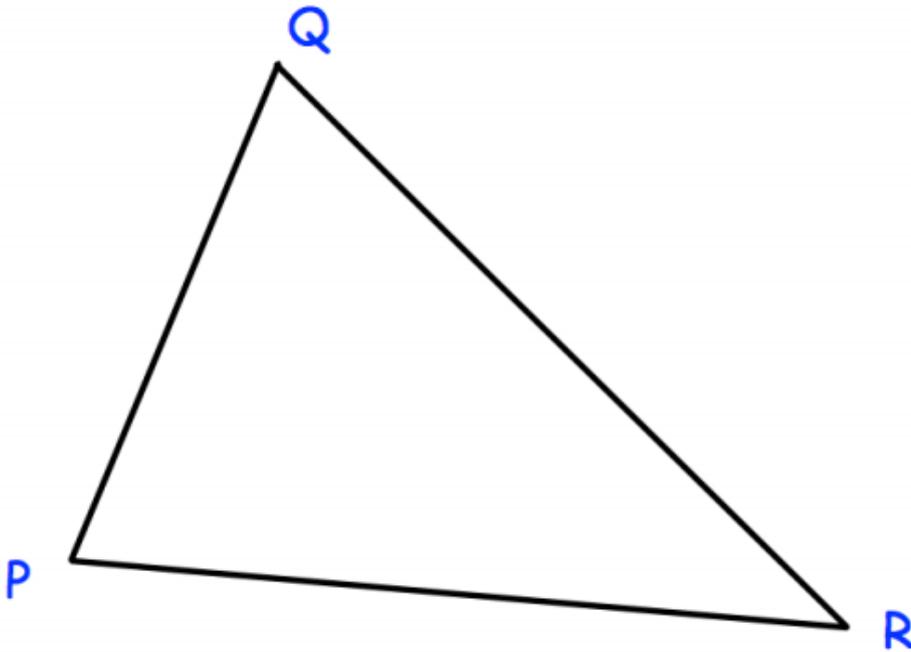
Construct the perpendicular bisector of the line QR using a pencil, ruler and pair of compasses. Do **not** erase your construction lines.   [2 marks]

Question 1 ~ 2 marks

2. This pie chart shows the favourite pizza toppings of a group of students.
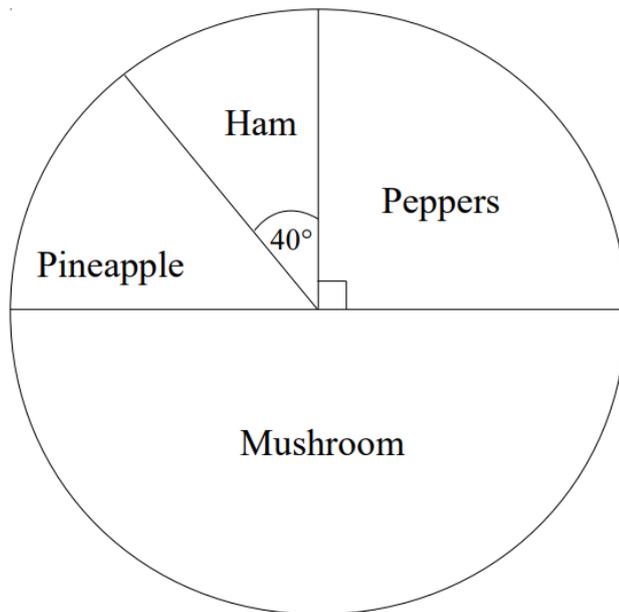
Not drawn accurately

a) What percentage of students had **peppers** as their favourite topping? [1 mark]

b) What is the angle of the sector in the pie chart that represents **pineapple**?
[1 mark]

c) 8 people said **ham** was their favourite. How many people said **mushroom** was their favourite? Show your working. [2 marks]

Question 2 ~ 4 marks

3. Jane has a bag which contains 10 coloured counters. 3 are blue, 2 are red and the rest are green.

Jane adds red counters to the bag so that she has a 50% chance of choosing a red counter when she chooses a counter at random. How many red counters does she add?

Show your working.
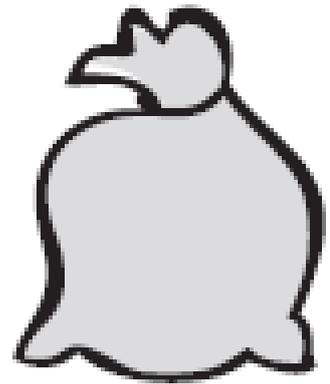
[3 marks]

Question 3 ~ 3 marks

4. William and Harry are given £500 by their grandmother. They have a discussion about how they should share it.

a) William wants to share the money in the ratio 5 : 3, giving himself the larger share. How much would Harry receive if they share the money in this way? Show your working. [2 marks]

b) Charles suggests William and Harry should share the money in the ratio 5 : 30. Write this ratio in its simplest form. [1 mark]

c) Give a reason why sharing the money exactly in the way Charles suggests would be impossible. [1 mark]

Question 4 ~ 4 marks

5. a) Work out the size of the angle y in the polygon below.

   Show your working. [2 marks]
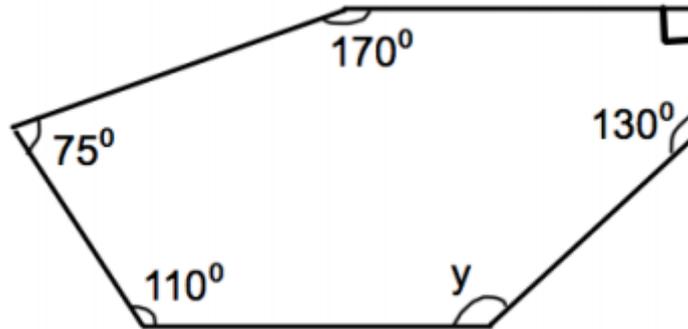
b) What is the size of each **exterior** angle in a **regular** octagon?

   Show your working. [2 marks]

Question 5 ~ 4 marks

6. A model boat is made using a ratio of 3 : 95.

The length of the model is 325mm.
What is the length of the real boat?
Show your working and give your answer in metres to one decimal place.

[3 marks]

Question 6 ~ 3 marks

7. The prime factorisation of 84 is $2^2 \times 3 \times 7$.

a) Find the prime factorisation of 180. Show your working. [2 marks]

b) What is the highest common factor of 84 and 180? Show your working.

[2 marks]

Question 7 ~ 4 marks

8. The graph below shows a sketch of the line $y = 3x + 5$
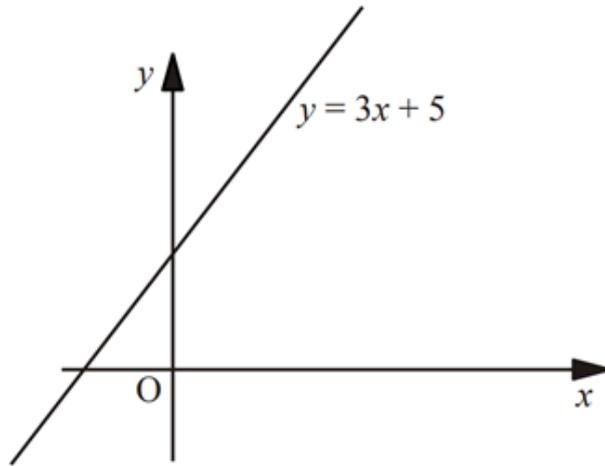
a) What is the y-coordinate of the point on the line with an x-coordinate of 2?

[1 mark]

b) What is the gradient of the line?   [1 mark]

c) Find the coordinates of the point where the line crosses the x-**axis**.
   Show your working.

[2 marks]

d) Is y directly proportional to x? Give a reason for your answer.

[1 mark]

e) State the equation of the line which is parallel to the line on the graph and which goes through the point (0, -1). [1 mark]

Question 8 ~ 6 marks

9. A student takes four exams and receives the following marks:

Exam 1	Exam 2	Exam 3	Exam 4
65	80	76	69

He takes a fifth exam and his mean mark for the five exams is 70.

What mark did he get in his fifth exam?

Show your working.   [3 marks]

Question 9 ~ 3 marks

10. Brenda carries out a survey in order to analyse how much money different age groups spend on video games. She plans to carry out the survey by stopping and asking people outside a video game shop in her town.

a) Explain a **disadvantage** of using this method to collect the survey data.

[1 mark]

b) Write a question that Brenda could include in her survey to find out how much people spend on video games.   [1 mark]

c) Brenda asks the question: "Why do you think that younger people play more video games?" Give a reason why this is a bad choice of question for Brenda's survey.

[1 mark]

d) Brenda surveys 7 people. Explain why it will be difficult to draw conclusions from the data she collects.   [1 mark]

Question 10 ~ 4 marks

11. A chef is completing calculations to help her with a recipe.

a) The recipe states that she needs $\frac{17}{4}$ litres of wine. How many litres is this as a mixed number? Show your working. [2 marks]

b) She starts with a full bag of flour. She uses a quarter of the bag of flour to make her first pie. Then she uses a quarter of what is left to make her second pie. What fraction of the full bag of flour is left after making the second pie?

Show your working. [3 marks]

c) The chef begins with a full jug of water, pours away 22% and is left with 585ml. How much water was in the jug when it was full? Show your working. [2 marks]

Question 11 ~ 7 marks

12. A cuboid block has length 20cm, width 7cm and height 4cm.
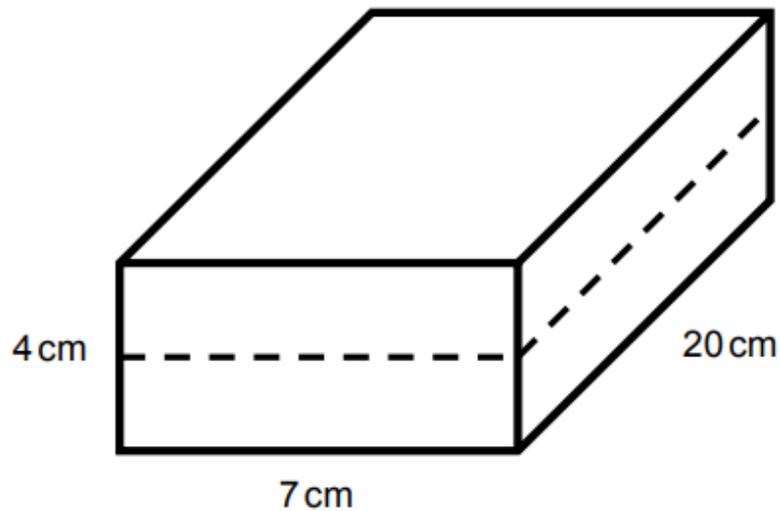
a) What is the volume of the block?
   Show your working and **give the units of your answer**.   [2 marks]

b) The block is cut into identical halves, as indicated in the diagram by the dotted line. What is the difference between the surface area of the original block and the total surface area of the two halves? Show your working.   [4 marks]

Question 12 ~ 6 marks

END OF TEST