

**Pre Public Examination**  
**November 2016**  
GCSE Mathematics (AQA style)

Higher Tier  
**Paper 1H**

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Name .....

Class .....

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**TIME ALLOWED**

1 hour 30 minutes

**INSTRUCTIONS TO CANDIDATES**

- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- You are **NOT** permitted to use a calculator in this paper.
- Do all rough work in this book.

**INFORMATION FOR CANDIDATES**

- The number of marks is given in brackets [ ] at the end of each question or part question on the Question Paper.
- **You are reminded of the need for clear presentation in your answers.**
- The total number of marks for this paper is **80**.

Question	Mark	out of
1		3
2		3
3		1
4		1
5		3
6		3
7		3
8		3
9		3
10		4
11		2
12		3
13		3
14		3
15		3
16		3
17		5
18		9
19		2
20		4
21		6
22		7
23		3
Total		80

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ANSWER IN THE SPACES PROVIDED**

1 Samina uses a recipe to make sponge cake.

**Sponge cake**  
4 eggs  
196g sugar  
210g butter  
220g flour

Samina has only **3 eggs**.

How much of each the remaining ingredients should she use to keep the recipe in proportion?

**[3 marks]**

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Sugar \_\_\_\_\_ g  
Butter \_\_\_\_\_ g  
Flour \_\_\_\_\_ g

2 Patrick earns £290 per week.

Patrick asks for an increase of £30 per week.  
Patrick's boss offers him a 11% increase.

Find the difference between the amount of money Patrick asked for and what was offered to him by his boss.

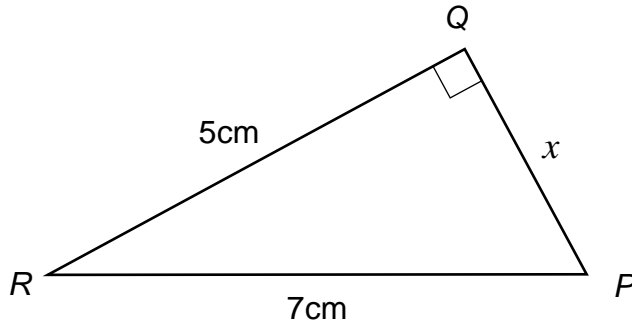
**[3 marks]**

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3 *PQR* is a right angled triangle.



Not drawn accurately

What is the length of the side marked *x*, when calculated to 1 decimal place?

Circle the correct answer.

- 3.1cm      3.9cm      4.9cm      5.1cm

[1 mark]

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4 The lengths of the sides of two squares are in the ratio 3 : 7.

What is the ratio of their areas?

Circle the correct answer.

- 6 : 14      3 : 7      9 : 49      1 : 4

[1 mark]

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5 Trevor buys 3 first class tickets and 2 standard class tickets for a train journey.

The total cost of the tickets that he buys is £449.50.

The cost of each standard class ticket is £45.50.

Find the cost of a first class ticket.

**[3 marks]**

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Answer £ \_\_\_\_\_

6 The square root of  $32 + x$  is between 6 and 7.

Find the range of values that  $x$  could take.

**[3 marks]**

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Answer \_\_\_\_\_  $< x <$  \_\_\_\_\_

7 Brian digs a hole in the shape of a cube. It is 2m long, 2m wide and 2m deep. Digging it takes Brian 32 hours in total.

He says to Callum that if the hole were 1m long, 1m wide and 1m deep., it would have taken half this time to dig.

Is Brian correct?

Tick a box.

Explain your answer.

Brian is correct

Brian is incorrect

**[3 marks]**

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8 The  $n$ th term of a sequence is  $4n - 2$ .

The  $n$ th term of a different sequence is  $3n - 2$ .

Find all three numbers, between 0 and 40, that are in both sequences.

**[3 marks]**

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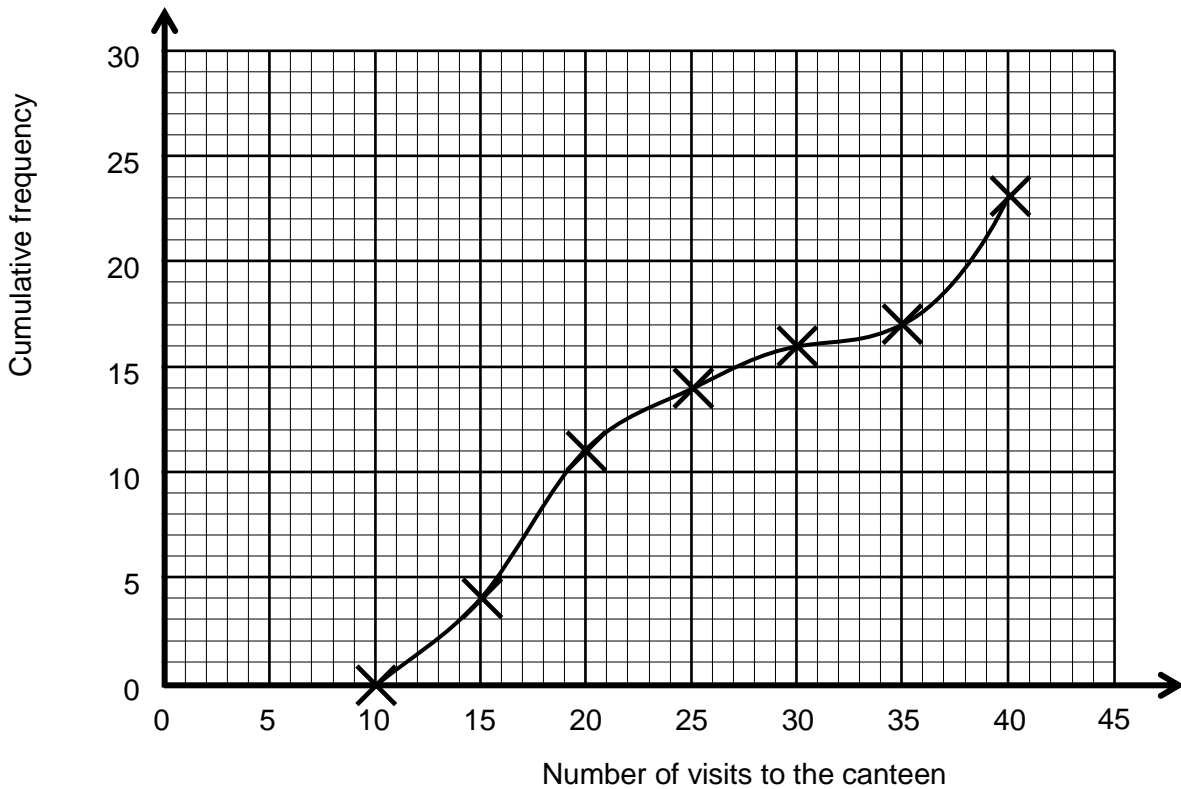
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Answer \_\_\_\_\_ , \_\_\_\_\_ and \_\_\_\_\_

9 A teacher recorded the number of times the pupils in his class used the school canteen in one term.

He drew a cumulative frequency curve to represent this data.



9 (a) Use the curve to estimate the median.

[1 mark]

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Answer \_\_\_\_\_

9 (b) Use the curve to estimate the interquartile range.

[2 marks]

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Answer \_\_\_\_\_

- 10** A biased spinner has six sides.  
The probability of landing on each is shown below.

Score	1	2	3	4	5	6
Probability	0.1	$\frac{1}{5}$	15%	0.05		0.3

- 10 (a)** Complete the table to show the probability of it landing on a score of 5. **[2 marks]**

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Answer \_\_\_\_\_

- 10 (b)** Charlotte spins the spinner 300 times.

Work out an estimate of the number of times that Charlotte should expect the spinner to land on a score of 4.

**[2 marks]**

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Answer \_\_\_\_\_

- 11** Solve  $7x + 2 < 9x - 3$ .

**[2 marks]**

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Answer \_\_\_\_\_



- 12** On a farm there are 156 more pigs than sheep.  
The ratio of pigs to sheep is 5:2.

How many pigs and sheep in total are on the farm?

**[3 marks]**

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Answer \_\_\_\_\_

- 13** Jonny is playing in a football league; he plays in a total of 8 matches.  
The mean number of goals he scores in his first 6 matches is 3.5

How many goals does Jonny need to score, in total, in the next two matches if he is to have a mean of 4 goals per match for all 8 matches?

**[3 marks]**

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Answer \_\_\_\_\_

- 14** A dog's weight, when given to two significant figures, is 8.1kg.

Use inequalities to write down limits between which the weight of the dog must lie.

**[3 marks]**

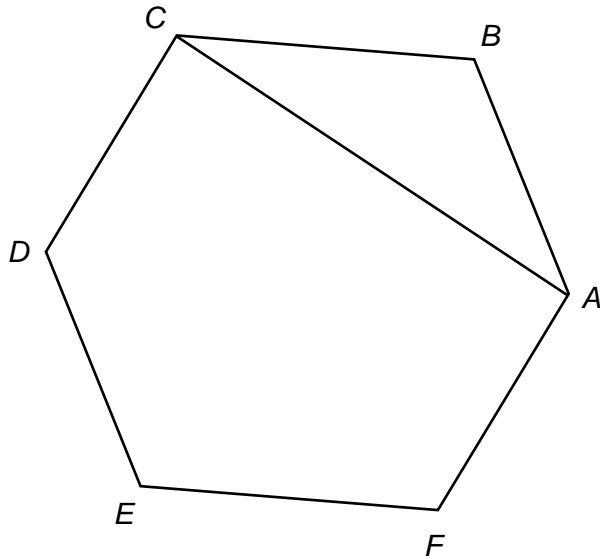
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Answer \_\_\_\_\_

15  $ABCDEF$  is a regular hexagon.



Not drawn accurately

Calculate the size of angle  $ACB$ .

[3 marks]

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Answer \_\_\_\_\_

16 Write  $2.\dot{3}\dot{1}\dot{4}$  as a fraction in its simplest form.

[3 marks]

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Answer \_\_\_\_\_

17 (a) Simplify the algebraic fraction

$$\frac{x^2 + 3x + 2}{x^2 - 1}$$

[3 marks]

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Answer \_\_\_\_\_

17 (b) Hence, or otherwise, explain how you know that

$$\frac{x^2 + 3x + 2}{x^2 - 1}$$

will always be an improper fraction for all integer values of  $x$ , where  $x > 1$ .

[2 marks]

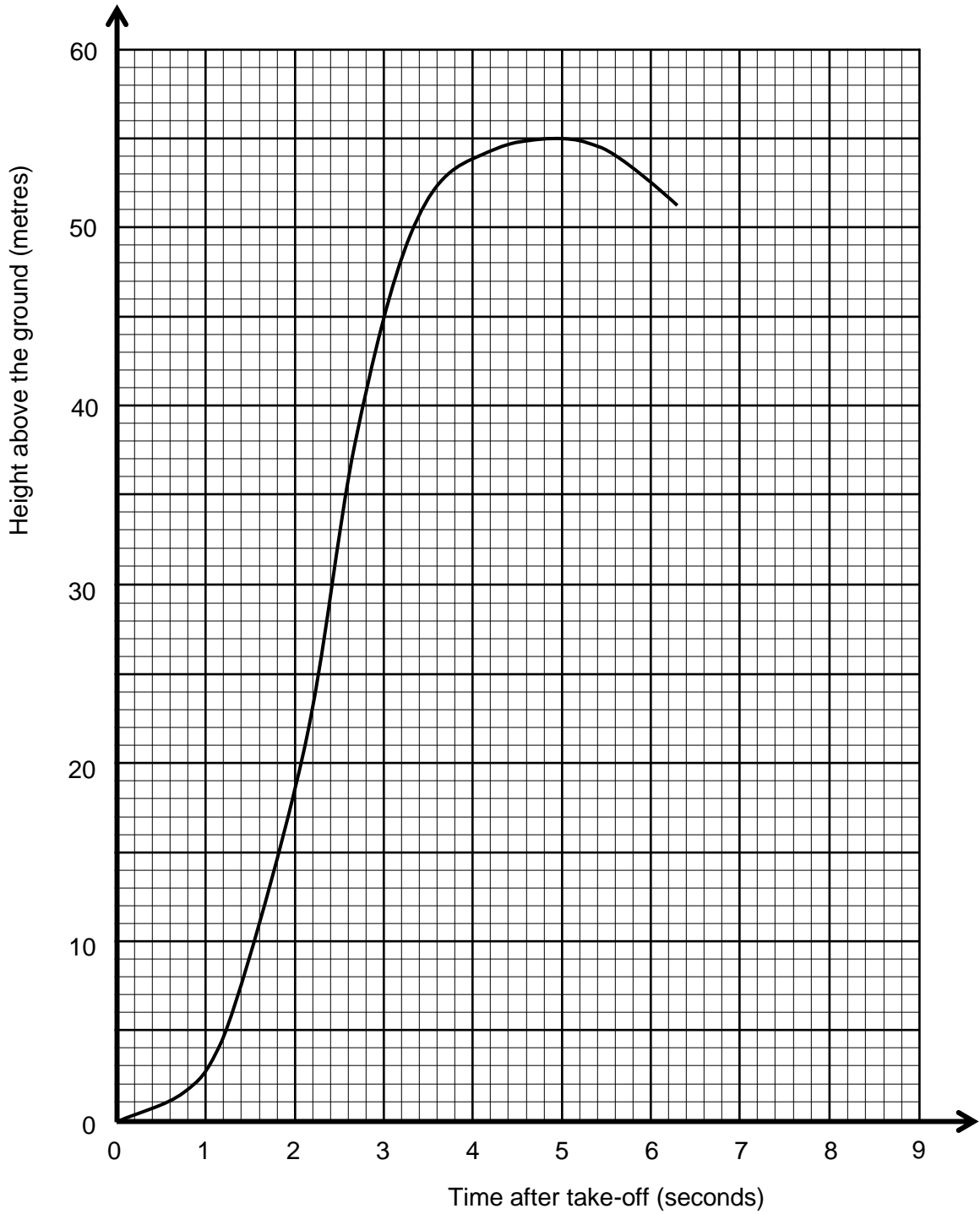
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- 18 The graph shows the height, above the ground, of a firework against the time after its take-off.



- 18 (a) Use the graph to find the greatest height reached by the firework.

[1 mark]

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Answer \_\_\_\_\_

**18 (b)** For how long is the firework moving upwards?

**[1 mark]**

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Answer \_\_\_\_\_

**18 (c)** Use a suitable straight line to estimate the speed of the firework 4 seconds after its take-off.

**[3 marks]**

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Answer \_\_\_\_\_

**18 (d)** Calculate the average speed of the firework while it is moving upwards.

Give your answer in kilometres per hour.

**[4 marks]**

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Answer \_\_\_\_\_

**19** James is trying to work out the values of  $x$  for which  $x^3 - 7x = -12$ .

He says that one value of  $x$  lies between  $-4$  and  $-3$ .

Is James correct?

Tick a box.

Explain your answer.

James is correct

James is incorrect

**[2 marks]**

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**20** Expand the brackets.

$$(2x + 3)(x - 3)(x - 2)$$

Give your expression in decreasing powers of  $x$ .  
Simplify terms where possible.

**[4 marks]**

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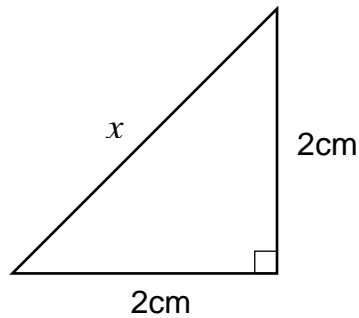
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Answer \_\_\_\_\_

21 (a) Find the length of  $x$ .

Give your answer in simplified surd form.



Not drawn accurately

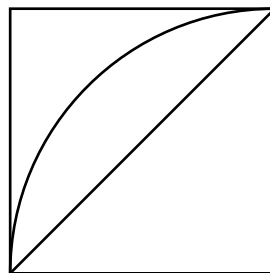
[3 marks]

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Answer \_\_\_\_\_

21 (b) The diagram shows a quarter of a circle, radius 2cm, inscribed in a square.



2cm

Not drawn accurately

By making use of the diagram, and your answer to (a), or otherwise, prove that

$$8 < \pi^2 < 16.$$

[3 marks]

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22

$$f(x) = x^2 - 1$$
$$g(x) = 3x + 2$$

22 (a) Find  $ff(x)$ .

Simplify your result.

[2 marks]

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Answer \_\_\_\_\_

22 (b) Find  $fg(x)$ .

Simplify your result.

[2 marks]

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Answer \_\_\_\_\_

22 (c) Solve  $fg(x) = 0$ .

[3 marks]

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Answer \_\_\_\_\_



**23** Amy's book says that  $\sin(75^\circ) = \frac{\sqrt{6} + \sqrt{2}}{4}$ .

Bob's book says that  $\sin(75^\circ) = \frac{1}{\sqrt{6} - \sqrt{2}}$ .

Prove that  $\frac{1}{\sqrt{6} - \sqrt{2}}$  is equivalent to  $\frac{\sqrt{6} + \sqrt{2}}{4}$ .

**[3 marks]**

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