NEW PRACTICE PAPER SET 1
Published September 2015

Please write clearly, in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE MATHEMATICS

H

Higher Tier Paper 3

Exam Date Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instuments.

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

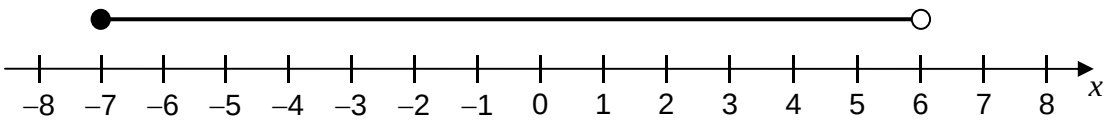
Advice

- In all calculations, show clearly how you work out your answer.

Answer **all** questions in the spaces provided.

1 Circle the inequality shown by the diagram.

[1 mark]



$-7 < x < 6$ $-7 \leqslant x < 6$ $-7 < x \leqslant 6$ $-7 \leqslant x \leqslant 6$

2 The probability that a biased coin lands on heads is $\frac{2}{3}$

The coin is spun twice.

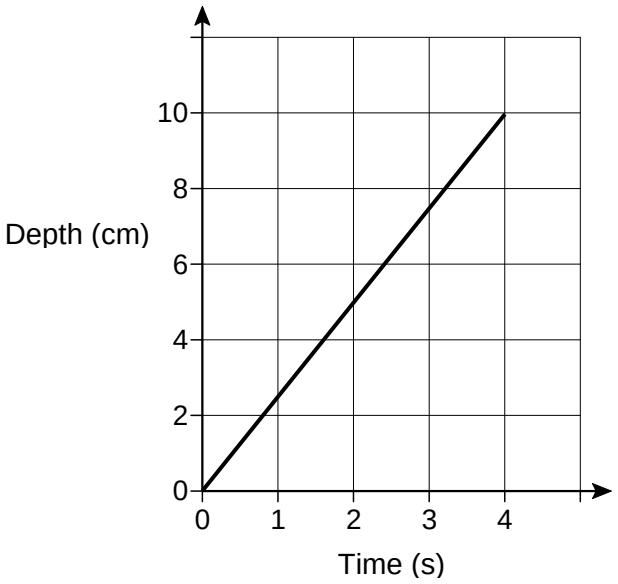
Circle the probability of two heads.

[1 mark]

$\frac{2}{9}$ $\frac{4}{6}$ $\frac{4}{9}$ $\frac{4}{3}$

3 Water is poured into a glass for 4 seconds.

The graph shows the depth of the water in the glass.



What is the rate of change of the depth of the water?

Circle your answer.

[1 mark]

0.4 cm/s 1.25 cm/s 2.5 cm/s 10 cm/s

4 The ratio of $x : y$ is 2 : 3

Circle the correct statement.

[1 mark]

x is $\frac{2}{3}$ of y y is $\frac{2}{3}$ of x x is $\frac{2}{5}$ of y y is $\frac{3}{5}$ of x

5 Factorise fully $9a^2 - 6a$

[2 marks]

Answer _____

6 Work out the next term of this quadratic sequence.

[2 marks]

4 12 24 40 _____

Answer _____

7 Here is an ordinary dice.

7 (a) Ali is going to throw the dice six times.

He says,

''I will get one of each number.''

Give a reason why he could be wrong.

[1 mark]

7 (b) Lucy throws the dice 50 times.

Her results are shown.

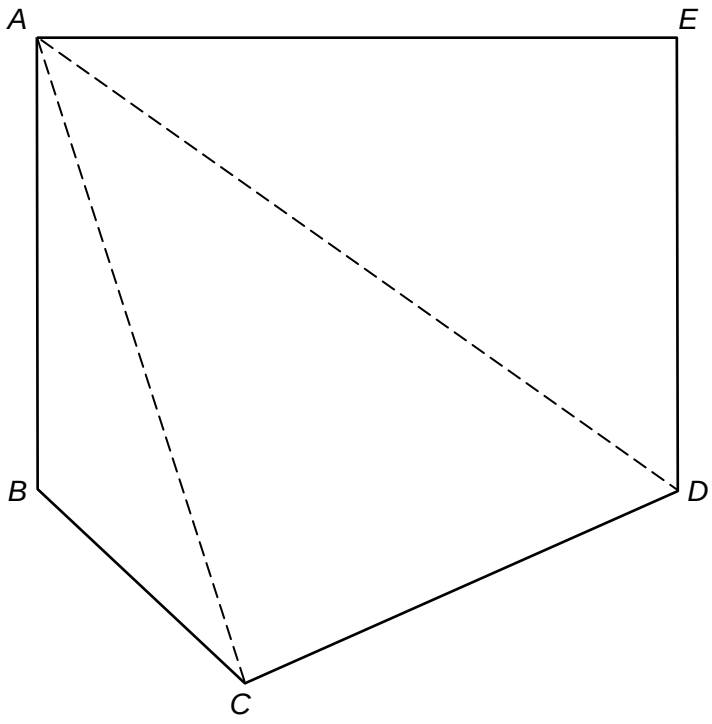
Number thrown	1	2	3	4	5	6
Frequency	7	4	12	5	9	13

Work out the relative frequency of throwing an odd number.

[2 marks]

Answer _____

8 Polygon *ABCDE* is divided into triangles as shown.



Not drawn accurately

Use the triangles to work out the sum of the interior angles of polygon *ABCDE*.

You **must** show your working.

[2 marks]

Answer _____ degrees

9 In a school, 60% of the students are girls.

50% of the girls walk to school.

20% of the boys walk to school.

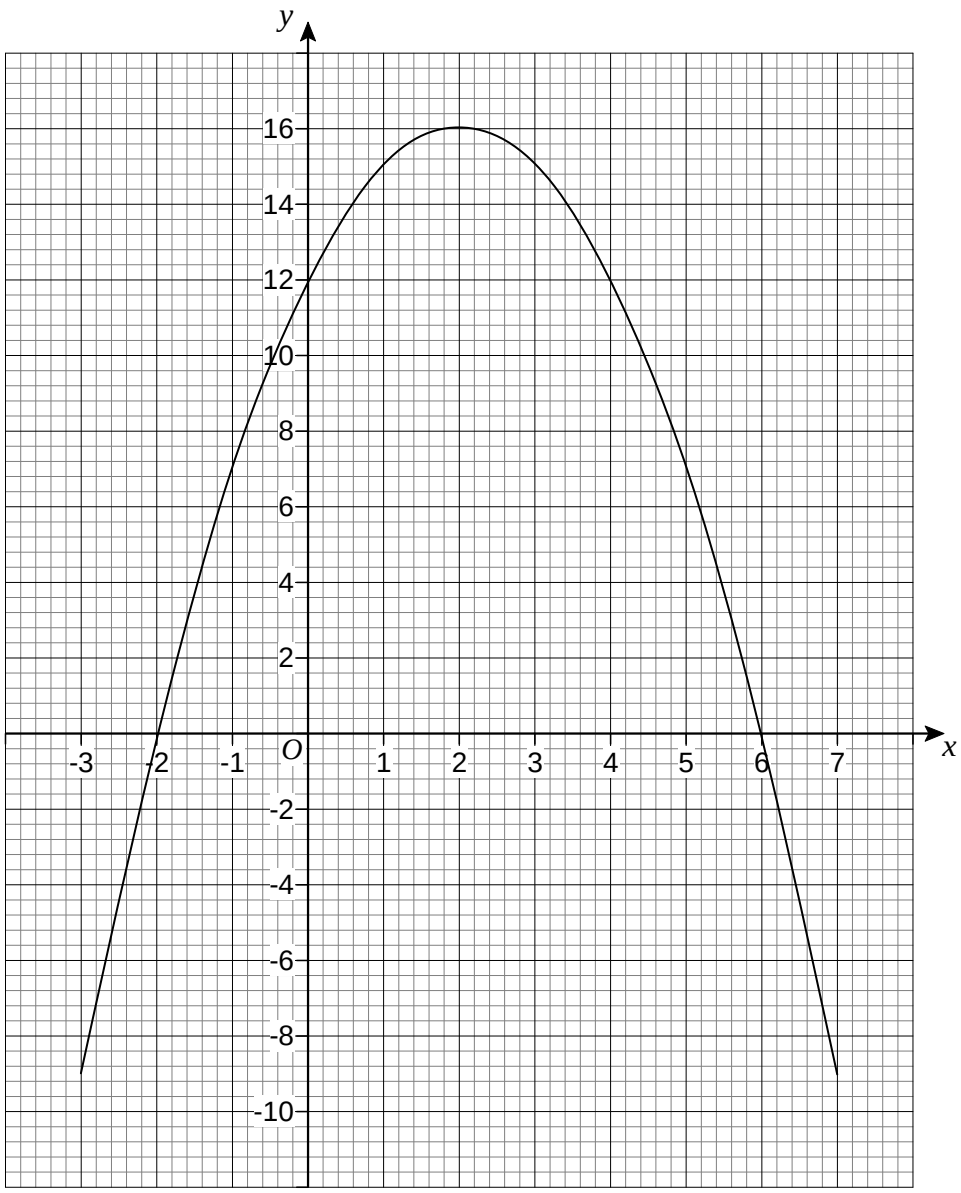
What percentage of the students walk to school?

[3 marks]

Answer _____ %

Turn over for the next question

10 The graph $y = a + bx - x^2$ is shown.



10 (a) Circle the coordinates of the turning point of the curve.

[1 mark]

(–2, 0) (0, 12) (2, 16) (6, 0)

10 (b) Circle the value of a.

[1 mark]

–2 12 16 6

10 (c) Circle the two roots of $a + bx - x^2 = 0$

[1 mark]

–2 and 6 | 2 and –6 | 2 and 6 | –2 and –6

11 Adam and six other men ran a race.

The times, in seconds, of the six other men are shown.

9.75 | 9.79 | 9.80 | 9.88 | 9.94 | 9.98

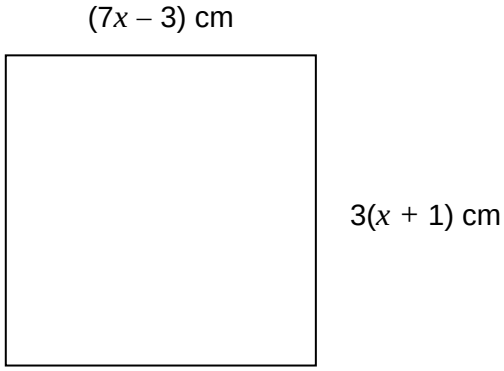
The mean time for **all** seven men was 9.83 seconds.

Did Adam win the race?

You **must** show your working.

[3 marks]

12 The diagram shows a square.



Work out the length of one side of the square.

[4 marks]

Answer _____ cm

13 A circle has equation $x^2 + y^2 = 4$

Circle the length of its radius.

[1 mark]

2 4 8 16

14 a, b and c are **different** prime numbers less than 20

$$a = \sqrt{4b + c}$$

Work out **two** possible sets of values of a, b and c.

[3 marks]

Set 1 $a =$ _____ $b =$ _____ $c =$ _____

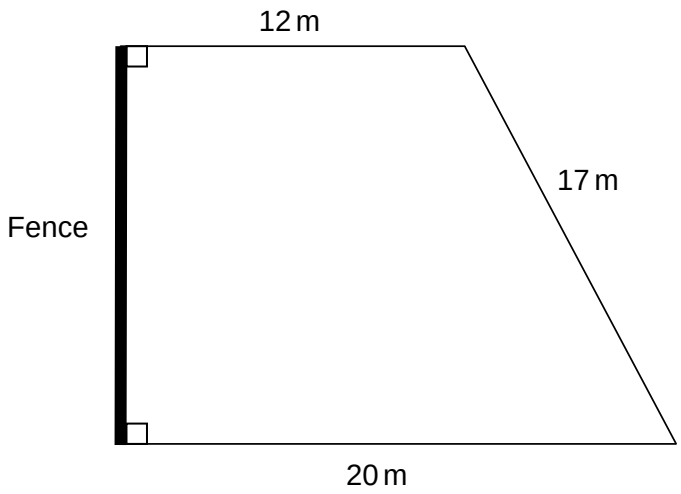
Set 2 $a =$ _____ $b =$ _____ $c =$ _____

15 Simplify fully $(8x^3y^5)^2$

[2 marks]

Answer _____

16 The diagram shows a lawn with a fence along one edge.



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One can of weedkiller covers 90 square metres.

Each can costs £19.25

Work out the total cost of the cans of weedkiller needed to cover the lawn.

[5 marks]

Answer £ _____

17 Expand and simplify $(2x + 5y)(3x - 8y)$

[3 marks]

Answer _____

18 The ratio of the number of boys to girls at a party is 3 : 4

Six boys leave the party.

The ratio of the number of boys to girls at the party is now 5 : 8

Work out the number of girls at the party.

[3 marks]

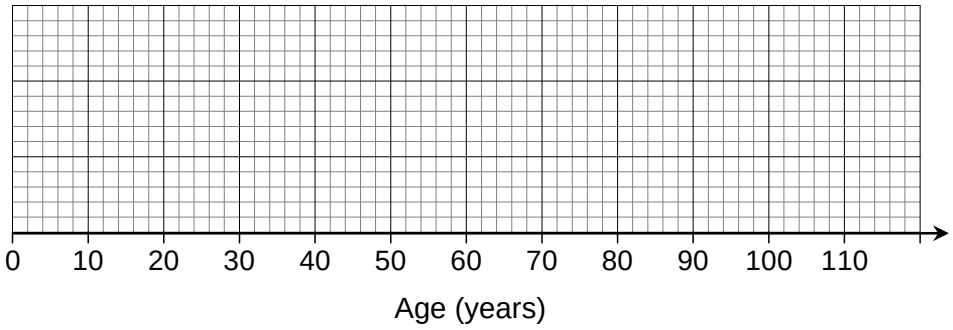
Answer _____

19 In the UK in 2000

25% of the population were under 24 years old
50% of the population were under 37 years old
the inter-quartile range of the ages was 32 years
the oldest person was 107 years old.

19 (a) Show the information on a box plot.

[3 marks]



19 (b) It is predicted that in 2050 the age distribution in the UK will have

lower quartile	26 years
median	44 years
upper quartile	66 years

Make **two** comments about the predicted change in the age distribution in the UK from 2000 to 2050

[2 marks]

Comment 1 _____

_____

_____

Comment 2 _____

_____

_____

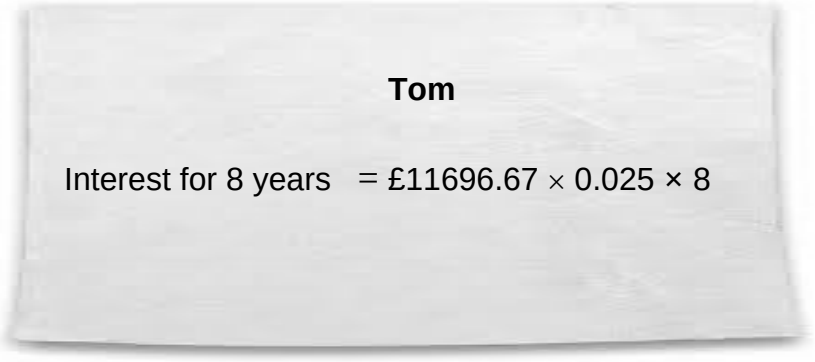
Turn over for the next question

20 An amount of money was invested for 8 years.

It earned **compound** interest at 2.5% per year.

After 8 years the total value of the investment was £11 696.67

20 (a) Tom is trying to work out the total interest earned.



State what is wrong with Tom's method.

[1 mark]

20 (b) Work out the total interest earned.

[3 marks]

Answer £ _____

21 Mersenne primes are prime numbers that can be written in the form

$2^n - 1$ where n is a whole number.

For example, 3 can be written as $2^2 - 1$

21 (a) Prove that $2^9 - 1$ is **not** a Mersenne prime.

[2 marks]

21 (b) There are Mersenne primes when $n = 5$ and when $n = 7$

Ama says,

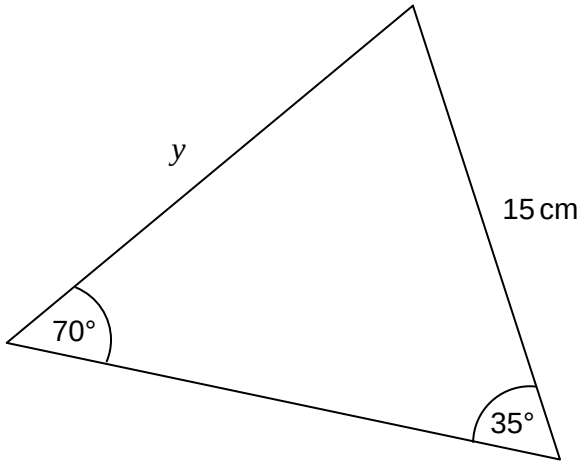
"The ratio of the indices is 5 : 7

This means the ratio of the Mersenne primes is 5 : 7"

Show that Ama is wrong.

[1 mark]

22



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Work out the value of y.

[2 marks]

Answer _____ cm

23 $2x^2 - 20x + c \equiv a(x - b)^2 + 3b$

Work out the value of c.

[3 marks]

Answer _____

Turn over for the next question

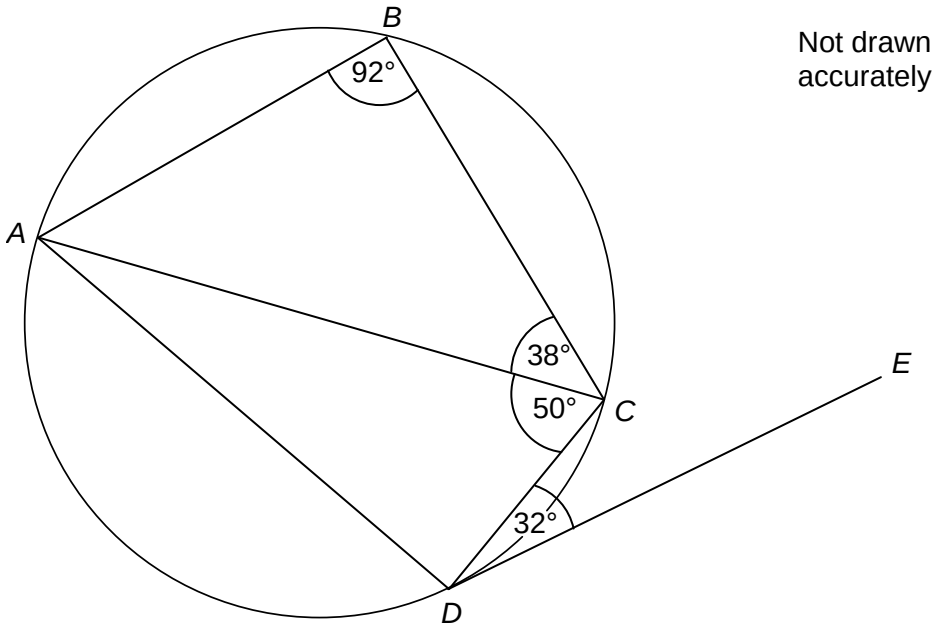
24 *A*, *B*, *C* and *D* are points on a circle.

Angle *ABC* = 92°

Angle *ACB* = 38°

Angle *ACD* = 50°

Angle *CDE* = 32°



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Tick whether each statement is true or false.

Give a reason for each answer.

[4 marks]

Statement	**True**	**False**
AC is a diameter	☐	☐

Reason _____

_____

_____

Statement	True	False
Angle *ADC* = 88°	☐	☐

Reason _____

_____

_____

Statement	True	False
ABCD is a trapezium	☐	☐

Reason _____

_____

_____

Statement	True	False
DE is a tangent to the circle	☐	☐

Reason _____

_____

_____

25 A formula connecting speed (s), distance (d) and time (t) is

$$s = \frac{d}{t}$$

$d = 160$ to 2 significant figures

$t = 7.2$ to 2 significant figures

Work out the upper and lower bounds for s.

Give your answers to 3 significant figures.

[4 marks]

Upper bound _____

Lower bound _____

26 For all values of x, $f(x) = x^2 + 1$ $g(x) = x - 5$

26 (a) Show that $fg(x) = x^2 - 10x + 26$

[2 marks]

26 (b) Solve $fg(x) = gf(x)$

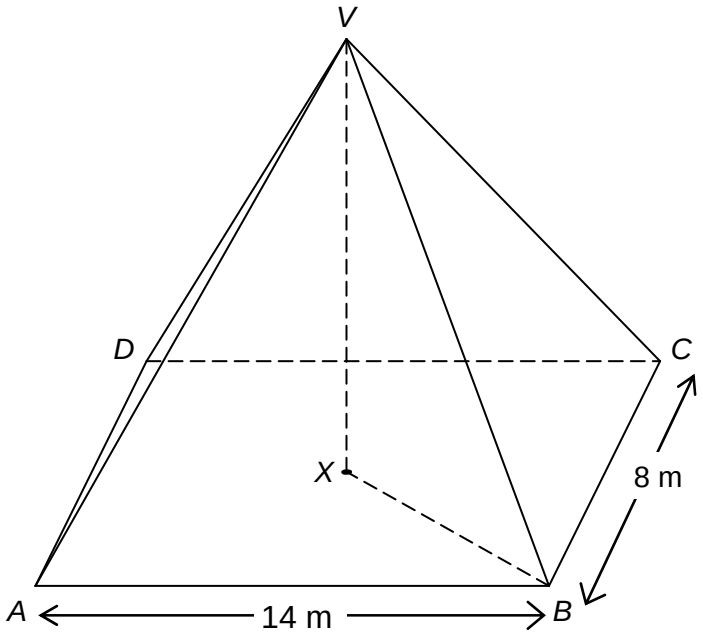
[4 marks]

$x =$ _____

27 Volume of a pyramid = $\frac{1}{3}$ × area of base × perpendicular height

VABCD is a rectangular-based pyramid with volume 336 m^3

X is the centre of the horizontal base, directly below *V*.



Work out the angle between *VB* and the base.

[6 marks]

Answer _____ degrees

END OF QUESTIONS

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