

Thursday 10 November 2016 – Morning

GCSE METHODS IN MATHEMATICS

B392/02 Methods in Mathematics 2 (Higher Tier)

Candidates answer on the Question Paper.

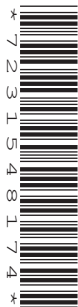
OCR supplied materials:

None

Other materials required:

- Scientific or graphical calculator
- Geometrical instruments
- Tracing paper (optional)

Duration: 2 hours



Candidate forename						Candidate surname					
Centre number						Candidate number					

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Your answers should be supported with appropriate working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

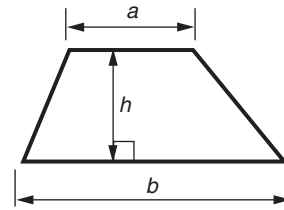
- The number of marks is given in brackets [] at the end of each question or part question.
- Quality of written communication will be assessed in questions marked with an asterisk (*).
- The total number of marks for this paper is **90**.
- This document consists of **16** pages. Any blank pages are indicated.



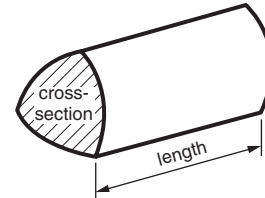
**You are permitted
to use a calculator
for this paper**

Formulae Sheet: Higher Tier

Area of trapezium $= \frac{1}{2} (a + b)h$



Volume of prism $= (\text{area of cross-section}) \times \text{length}$

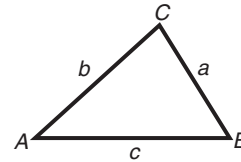


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

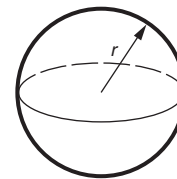
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle $= \frac{1}{2} ab \sin C$



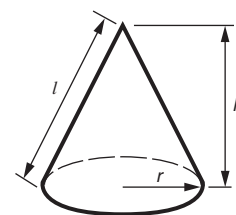
Volume of sphere $= \frac{4}{3} \pi r^3$

Surface area of sphere $= 4\pi r^2$



Volume of cone $= \frac{1}{3} \pi r^2 h$

Curved surface area of cone $= \pi r l$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$,
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

PLEASE DO NOT WRITE ON THIS PAGE

3

Answer **all** the questions.

- 1 (a) (i) Convert $\frac{17}{20}$ to a percentage.

(a)(i) % [1]

- (ii) Convert $\frac{47}{3}$ to a decimal.

(ii) [2]

- (b) x and y are two different numbers.

$$xy = 1$$

- (i) Write down a possible pair of values of x and y .

(b)(i) $x =$, $y =$ [1]

- (ii) What is the value of y when $x = -8$?

(ii) $y =$ [1]

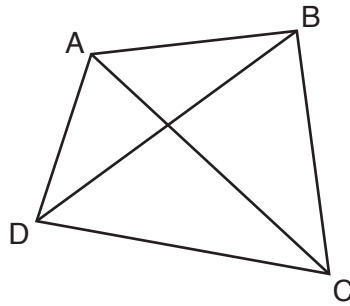
- (c) Cherie won some money. She gave away a quarter of the money.
Cherie spent a quarter of the money she had left.

What fraction of the original amount did Cherie then **have left**?

(c) [2]

4

- 2* Gary thinks that the angle sum of a quadrilateral is 720° .
His proof is shown below. It is **not** correct.



ABCD is a quadrilateral.

It can be split into four triangles, as shown.

The angle sum of each triangle is 180° so the quadrilateral adds up to $4 \times 180^\circ = 720^\circ$.

Write a correct proof that the sum of the angles of a quadrilateral is 360° . You are advised to include a diagram as part of your proof.

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..... [2]

5

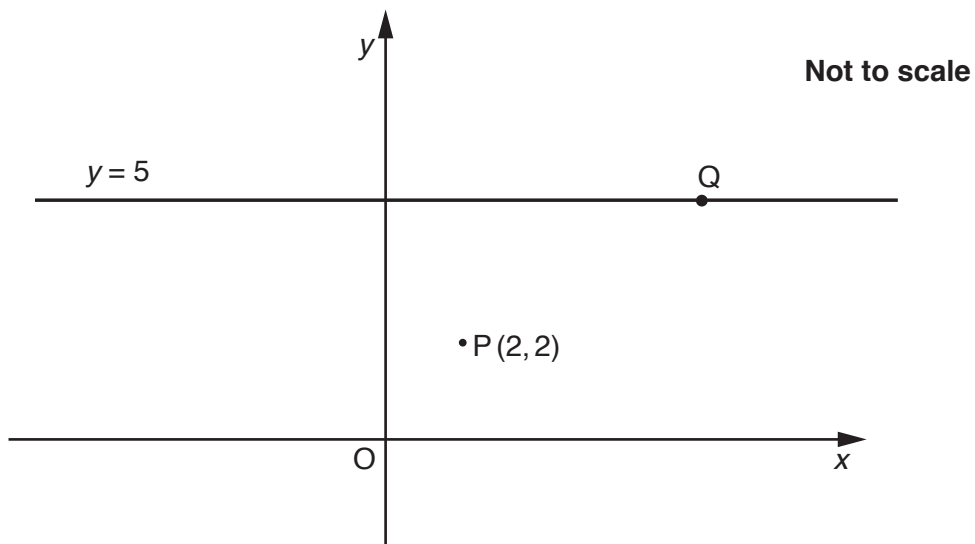
3 Solve.

(a) $5(2x - 1) = 8$

(a) [3]

(b) $3x + 19 > 4$

(b) [2]

4 P is the point with coordinates (2, 2). Q is a point on the line $y = 5$.

The distance from P to Q is 5 units.

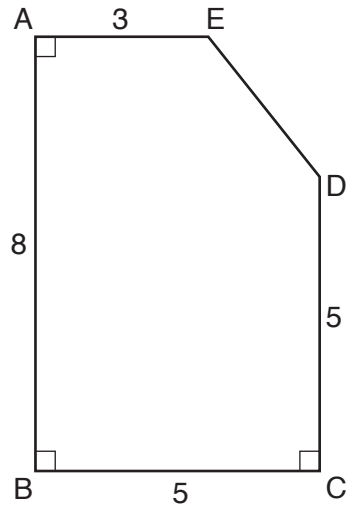
Find the coordinates of Q.

(.....,) [5]

Turn over

6

- 5 ABCDE is a pentagon. The angles at A, B and C are right angles. The diagram below shows the lengths of the sides of the pentagon in centimetres.



Not to scale

- (a) Calculate the area of pentagon ABCDE.

(a) cm^2 [4]

- (b) Calculate angle AED.

(b) $^\circ$ [4]

7

- 6 A club has more men members than women members. The ratio of men to women is 5 : 3.

(a) What fraction of the club members are women?

(a) [1]

(b) There are 348 women members.

How many men are there?

(b) [2]

(c) Some new members join the club. They are all women.

The ratio of men to women is now 4 : 3.

How many women joined the club?

(c) [3]

(d)* The club sells honey to its members.

A jar containing 250g of honey costs £1.80.

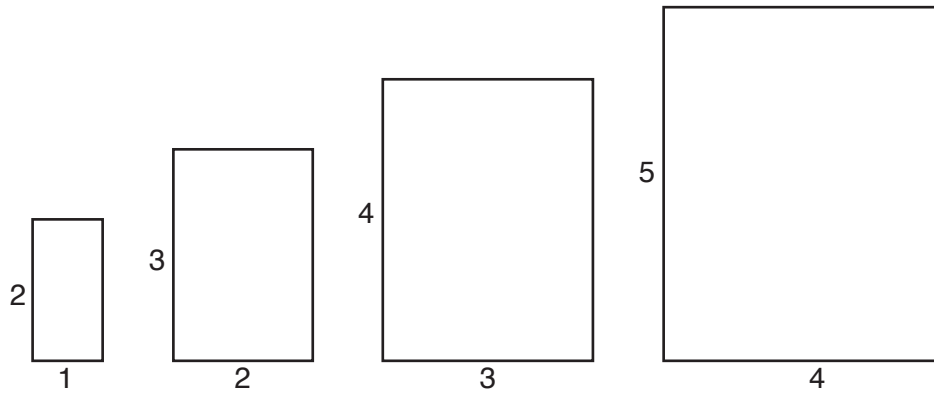
A jar containing 400g of honey costs £3.20.

Which jar is better value?

.....
.....
.....
..... [3]

8

- 7 The first four rectangles in a sequence of rectangles are shown below. The lengths of the sides are shown in centimetres.



- (a) What is the area of the fifth rectangle in the sequence?

(a) cm^2 [2]

- (b) Write an expression for the area of the n th rectangle in the sequence.

(b) cm^2 [2]

- (c)* Explain why there cannot be a rectangle in the sequence with area 1089cm^2 .

.....

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..... [3]

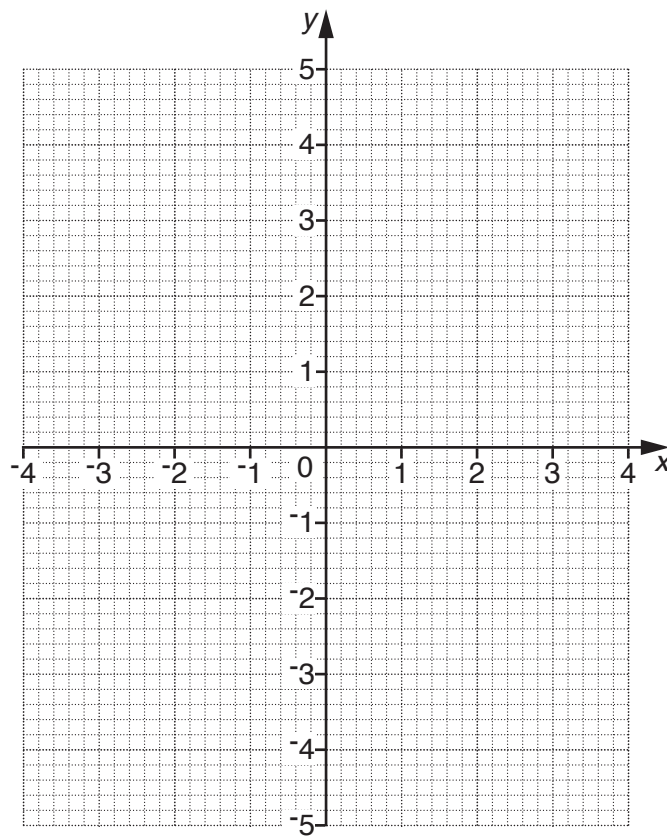
9

- 8 (a) Complete the table for $y = 4 - x^2$.

x	-3	-2	-1	0	1	2	3
y		0		4			-5

[2]

- (b) Draw the graph of $y = 4 - x^2$ for $-3 \leq x \leq 3$.



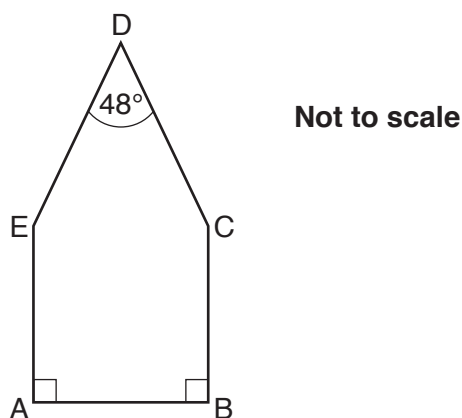
[2]

- (c) Use your graph to solve the equation $4 - x^2 = 1$.
Give your answers correct to 1 decimal place.

(c) [2]

10

- 9 (a) ABCDE is a pentagon. Angle EAB = angle ABC = 90° . Angle CDE = 48° .

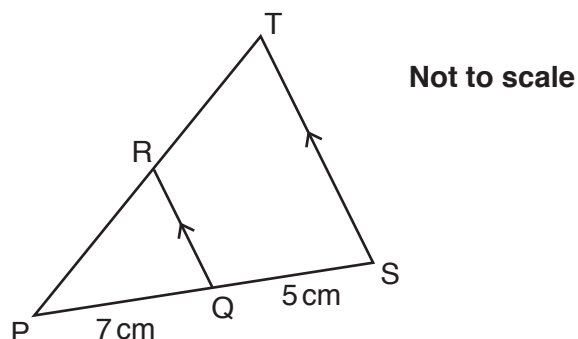


Angle BCD = angle DEA.

Calculate the size of angle BCD.

(a) $^\circ$ [3]

- (b) In the diagram, QR is parallel to ST. PQ = 7 cm. QS = 5 cm.
PRT and PQS are straight lines.



PT = 15 cm.

Calculate the length of PR.

(b) cm [3]

11

10 (a) Solve the simultaneous equations.

$$\begin{aligned}x - 6y &= 16 \\ 7x + 2y &= 2\end{aligned}$$

(a) $x = \dots\dots\dots$, $y = \dots\dots\dots$ [3]

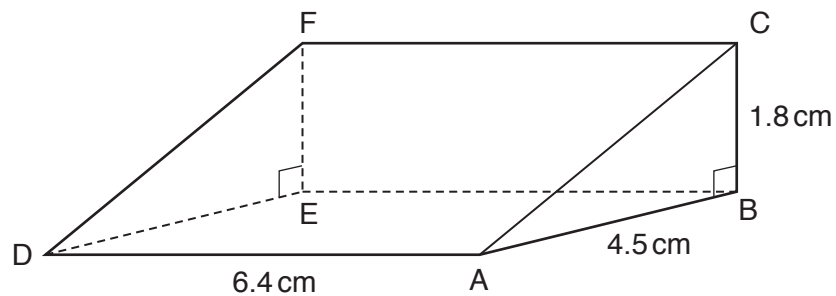
(b) Expand and simplify.

$$(7x + 5)(4x - 3)$$

(b) $\dots\dots\dots$ [3]

12

- 11 ABCDEF is a triangular prism. The triangular faces are right-angled at B and E. The other three faces are rectangles. $AB = 4.5\text{ cm}$. $BC = 1.8\text{ cm}$. $AD = 6.4\text{ cm}$.

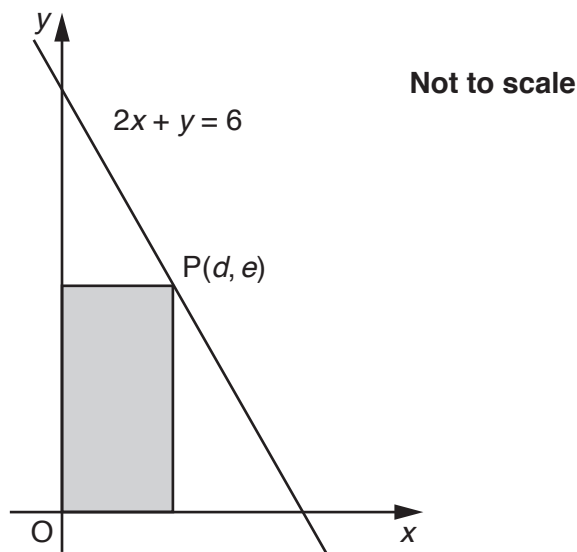


Calculate the length of CD. Give your answer correct to 3 significant figures.

..... cm [4]

13

- 12 The point $P(d, e)$ lies on the line $2x + y = 6$. Both coordinates of P are positive. A rectangle has two of its sides on the axes. P and the origin, O , are opposite corners of the rectangle.



- (a) The area of the rectangle is 3.

Show that $2d^2 - 6d + 3 = 0$.

.....

.....

.....

..... [3]

- (b) Solve.

$$2d^2 - 6d + 3 = 0$$

Give your answers correct to 2 decimal places.

(b) [3]

14

- 13** A house increases in value each year by 15% of its value at the start of the year.
It is worth £119 025 at the end of two years.

(a) By what percentage has the value of the house increased from the start of the first year to the end of the second year?

(a) % **[3]**

(b) What was the value of the house at the start of the two years?

(b) £ **[2]**

15

- 14 (a) Make x the subject of the formula.

$$y = \frac{2x - 1}{x + 3}$$

(a) [4]

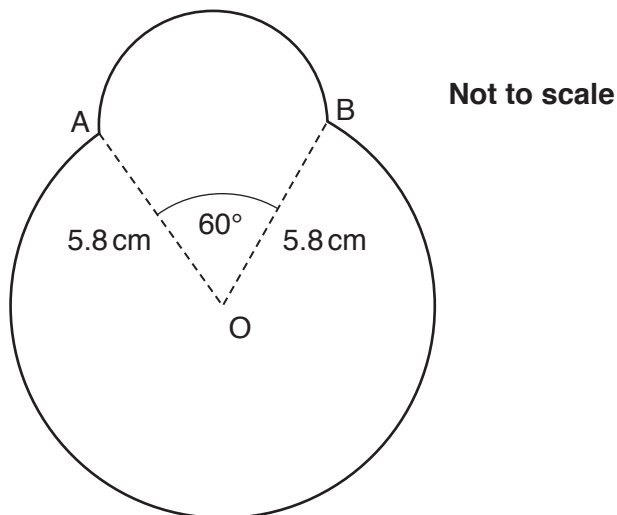
- (b) Simplify.

$$\frac{x + 3}{2x^2 + 5x - 3}$$

(b) [3]

16

- 15 The shape below has a perimeter that consists of
- a major arc AB of a circle with centre O and radius 5.8 cm
- and
- a semicircle with AB as diameter.
- Angle AOB is 60° .



Calculate the total area of the shape.

..... cm^2 [7]

END OF QUESTION PAPER

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