Cambridge O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

8294703215

MATHEMATICS (SYLLABUS D) **4024/12**

Paper 1 **May/June 2017**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

If working is needed for any question it must be shown in the space below that question.
Omission of essential working will result in loss of marks.

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 80.

This document consists of **19** printed pages and **1** blank page.

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[Turn over

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

1 **(a)** Evaluate $\frac{4}{5} - \frac{1}{3}$.

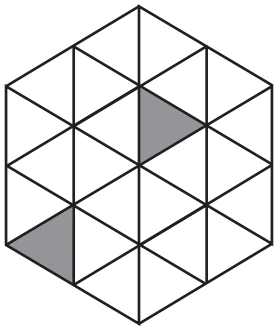
Answer ..... [1]

(b) Evaluate 0.2×0.006 .

Answer ..... [1]

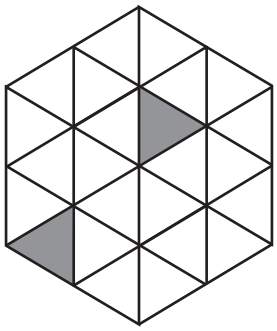
---

2 **(a)** Shade **one** more small triangle in the shape below to make a pattern with one line of symmetry.



[1]

(b) Shade **two** more small triangles in the shape below to make a pattern with rotational symmetry of order 2.



[1]

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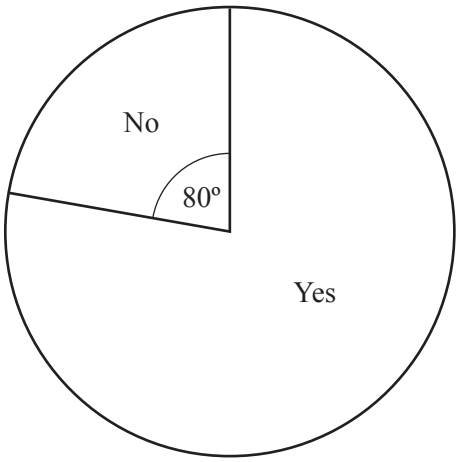
3 By writing each number correct to one significant figure, estimate the value of

$$\frac{58.7 \times 4.08}{19.7^3}.$$

Answer ..... [2]

4



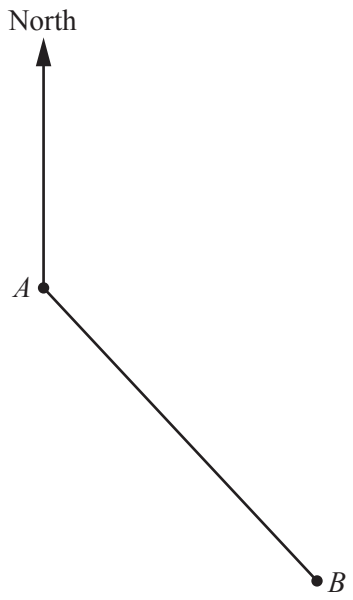
A group of students were asked if they wanted a later start to the school day.
The pie chart summarises the results.
200 students said no.

Work out the number of students who said yes.

Answer ..... [2]

---

5 The diagram shows the position of two villages A and B.



(a) Measure the bearing of B from A.

Answer ..... [1]

(b) The bearing of village C from A is 265°.

Work out the bearing of A from C.

Answer ..... [1]

---

6 A thermometer measures temperature correct to the nearest degree.
The outside temperature is measured as –8 °C.

(a) Write down the upper bound of the outside temperature.

Answer ..... °C [1]

(b) The inside temperature is measured as 10 °C.

Calculate the lower bound of the difference between the outside temperature and the inside temperature.

Answer ..... °C [1]

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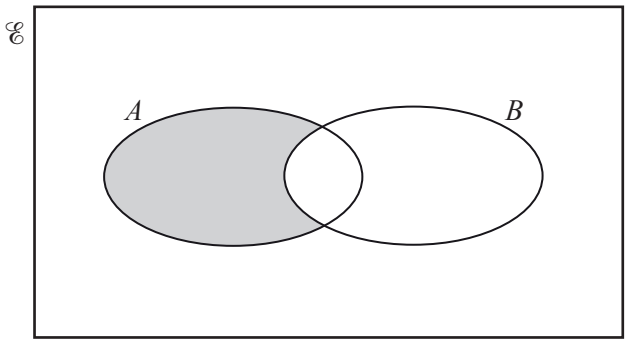
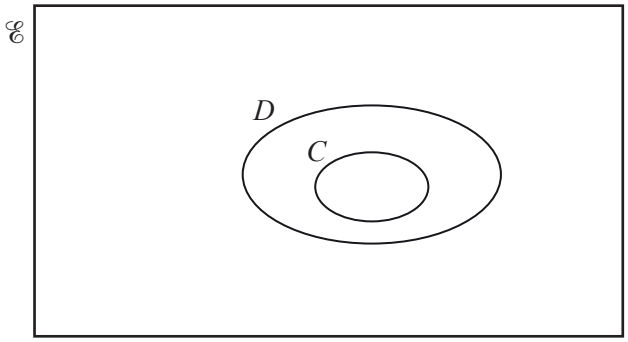
7 **(a)** Use set notation to describe the shaded set in the Venn diagram.



Answer ..... [1]

(b) Use set notation to complete the statement about sets C and D.



Answer C ..... D [1]

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8 **(a)** A film starts at 22 35 and finishes at 01 20.

How long, in hours and minutes, does the film last?

Answer ..... hours ..... minutes [1]

(b) On 1 May, Leila starts to go swimming every day.
She swims 30 lengths of the swimming pool every day.
The swimming pool is 20 m long.

Work out the date when Leila has swum a total of 10 km.

Answer ..... [2]

---

9 **(a)** Write down all the integers that satisfy the inequality $-\frac{3}{2} \leqslant x < 2$.

Answer ..... [1]

(b) Complete the following inequality with a fraction.

$$\frac{3}{4} > \text{.....} > \frac{1}{2}$$

[1]

(c) Write down an irrational value of n that satisfies this inequality.

$$2 < n < 3$$

Answer ..... [1]

10 **(a)** Here are the masses, in grams, of 8 apples.

189 175 185 192 202 161 174 196

Find the median mass.

Answer ..... g [1]

(b) A bag contains 5 carrots.
The mean mass of the carrots is 60 g.

Another carrot is added to the bag.
The mean mass of the 6 carrots is 65 g.

Work out the mass of the carrot added to the bag.

Answer ..... g [2]

---

11 Solve the simultaneous equations.

$$5x - 2y = 16$$
$$3x + 4y = 7$$

Answer $x =$ .....

$y =$ ..... [3]

---

12 y is inversely proportional to the square of x.
The table shows some values for x and y.

x	2	4	p
y	3	$\frac{3}{4}$	48

(a) Find the equation connecting x and y.

Answer ..... [2]

(b) Find the value of p.

Answer $p =$ ..... [1]

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13 **(a)** Rani has \$240.

She spends $\frac{5}{8}$ of this on a new phone.

Work out the cost of the phone.

Answer \$ ..... [1]

(b) Anna invests \$150 in an account that pays simple interest.
She leaves the money in the account for 4 years.
At the end of 4 years she has \$162.

Work out the rate of simple interest paid per year.

Answer ..... % [2]

---

14 $$f(x) = \frac{3x - k}{4}$$

(a) Given that $f(11) = 7$, find the value of k.

Answer $k =$ ..... [2]

(b) Find $f^{-1}(x)$.

Answer $f^{-1}(x) =$ ..... [2]

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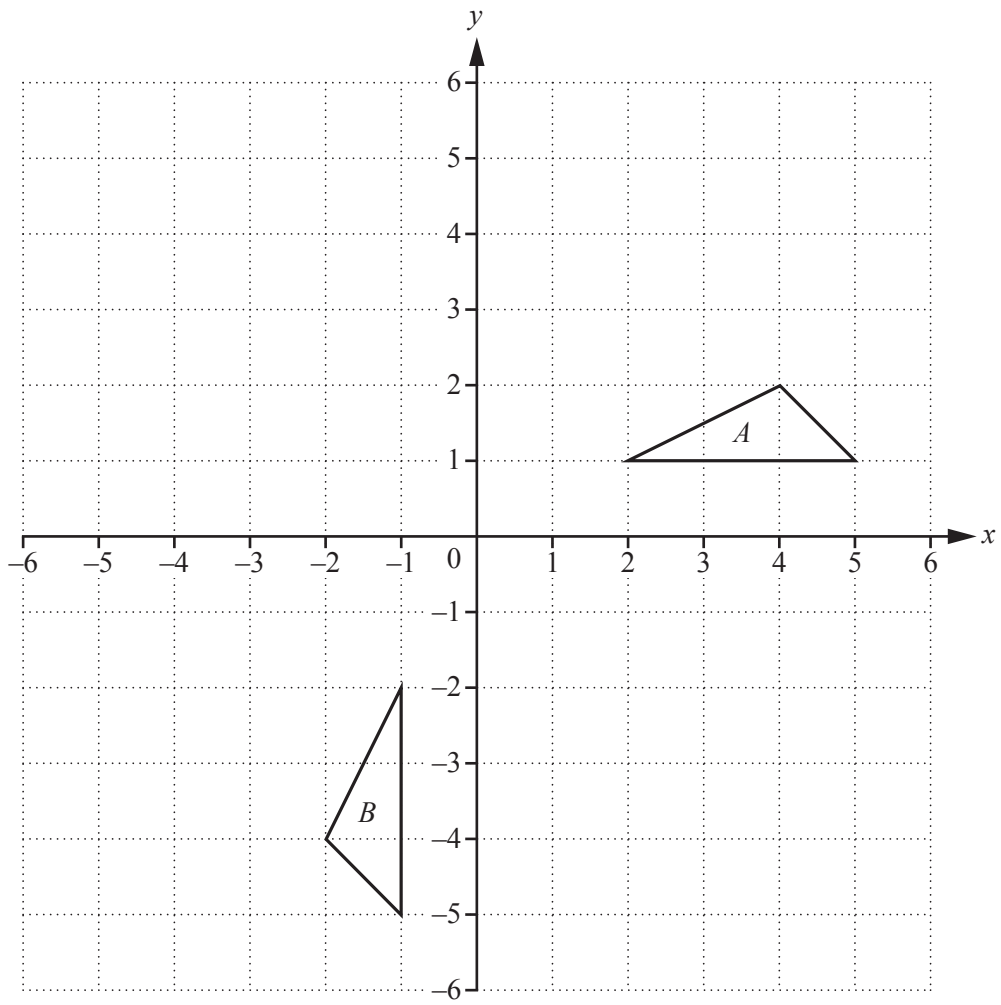
15 The diagram shows triangles A and B.



(a) Describe fully the **single** transformation that maps triangle A onto triangle B.

Answer .....

..... [2]

(b) Triangle A is mapped onto triangle C by a rotation, 90° anti-clockwise about the origin.

On the diagram, draw triangle C. [2]

16 A is the point (0, 3), B is the point (1, 5) and C is the point (p, –1).

(a) Find the equation of the line AB.

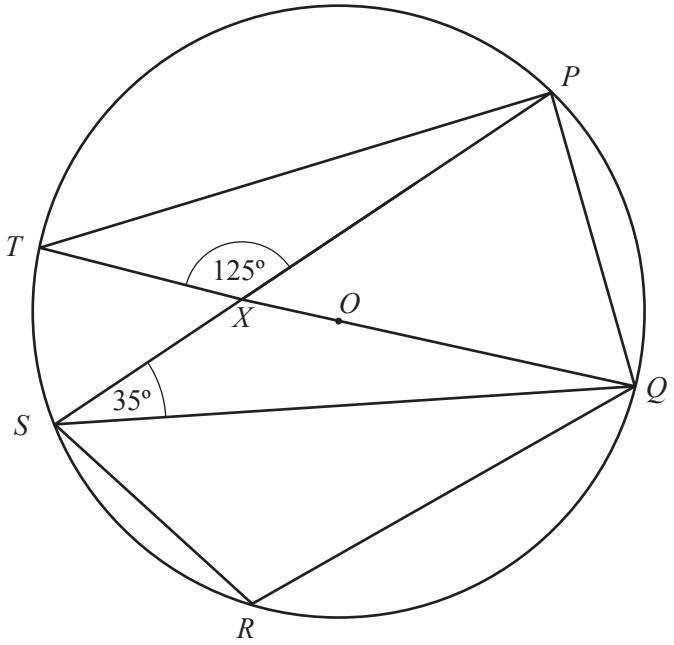
Answer ..... [2]

(b) The gradient of the line BC is $-\frac{3}{4}$.

Find the value of p.

Answer $p =$ ..... [2]

17



In the diagram, P, Q, R, S and T lie on the circle.
QT is a diameter of the circle, centre O.
X is the point of intersection of PS and QT.
$P\hat{X}T = 125°$ and $P\hat{S}Q = 35°$.

(a) Complete the following statement with a geometrical reason.

$P\hat{T}Q = 35°$ because ..... [1]

(b) Find $P\hat{Q}T$.

Answer $P\hat{Q}T =$ ..... [1]

(c) Find $S\hat{P}Q$.

Answer $S\hat{P}Q =$ ..... [1]

(d) Find $S\hat{R}Q$.

Answer $S\hat{R}Q =$ ..... [1]

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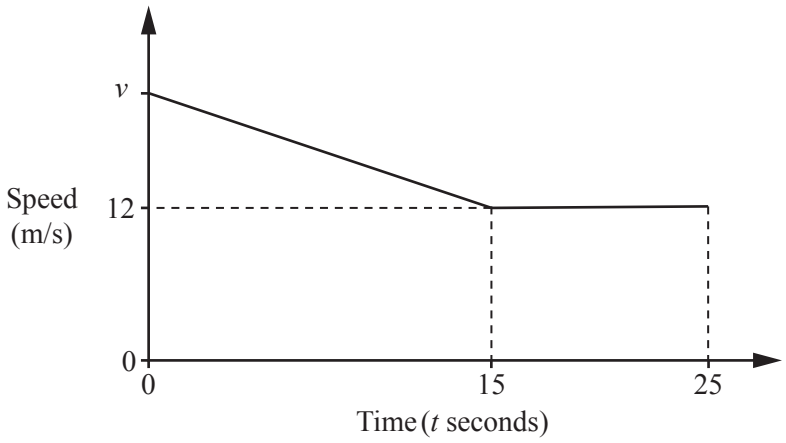
18 The diagram is the speed-time graph for 25 seconds of a car's journey.



The car slows down uniformly from a speed of v m/s to a speed of 12 m/s in 15 seconds.
It then travels at constant speed for a further 10 seconds.

(a) The retardation of the car is 0.4 m/s^2.

Calculate the value of v.

Answer $v =$ ..... [2]

(b) Calculate the distance travelled by the car from $t = 0$ to $t = 25$.

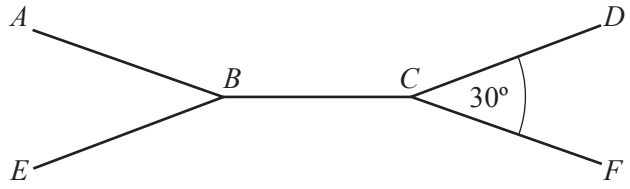
Answer ..... m [2]

19 **(a)** A pentagon has four angles of $2x°$ and one angle of $x°$.

Calculate the value of x.

Answer $x =$ ..... [2]

(b) $ABCD$ and $EBCF$ are parts of two identical regular n-sided polygons.



The two polygons are joined together along edge BC.
Angle $DCF = 30°$.

Calculate the value of n.

Answer $n =$ ..... [2]

20 **(a)** **(i)** Write 54 as the product of its prime factors.

Answer ..... [1]

(ii) Find the smallest possible integer m such that $54m$ is a cube number.

Answer $m =$ ..... [1]

(b) Find the value of k in each of the following.

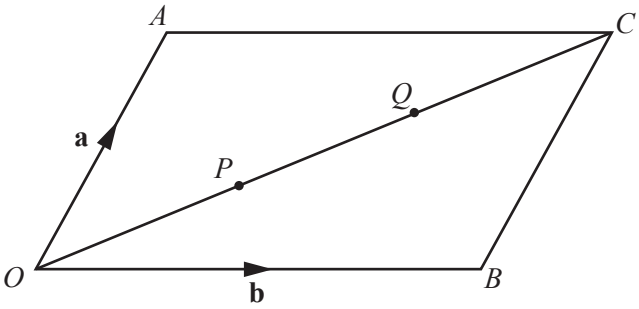
(i) $\sqrt{27} = 3^k$

Answer $k =$ ..... [1]

(ii) $\left(\frac{1}{4}\right)^{-3} = 2^k$

Answer $k =$ ..... [1]

21



$OACB$ is a parallelogram.
$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.
P and Q are points on OC such that $OP = PQ = QC$.

(a) Express, as simply as possible, in terms of **a** and **b**,

(i) $\overrightarrow{OP}$,

Answer ..... [1]

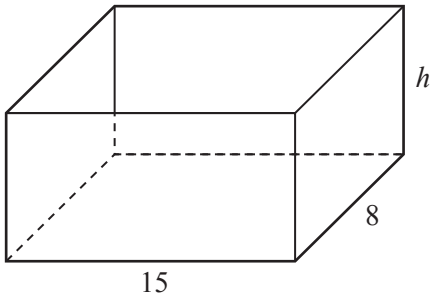
(ii) $\overrightarrow{BP}$.

Answer ..... [1]

(b) Show that triangles OAQ and CBP are congruent.

[2]

22



A container is made out of thin material in the shape of a cuboid with an open top.
The container has length 15 cm and width 8 cm.
The volume of the container is 720 cm^3.

(a) Calculate the height, h cm, of the container.

Answer ..... cm [2]

(b) Calculate the surface area of the **outside** of the container.

Answer ..... cm^2 [2]

(c) Liquid is poured into the container.
The liquid fills 60% of the container.

Calculate the height of the liquid in the container.

Answer ..... cm [1]

23 **(a)** Solve $\dfrac{7x}{4-3x} = 3$.

Answer $x =$ ..... [2]

(b) Simplify fully $\dfrac{4x^2 - 9}{2x^2 - 13x + 15}$.

Answer ..... [3]

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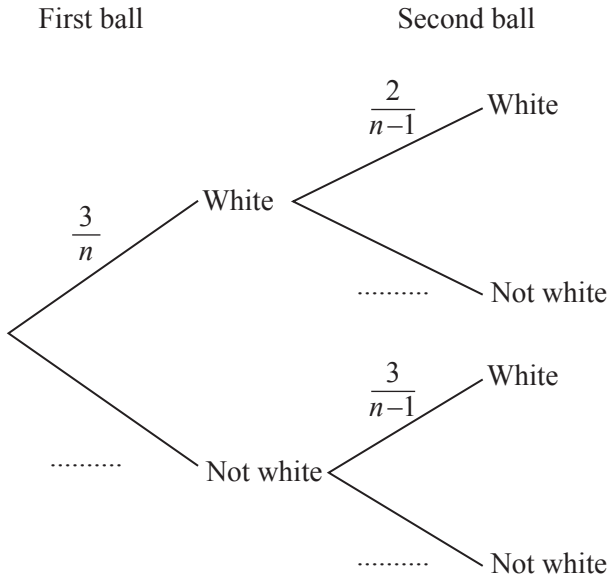
24 A bag contains n balls.
3 of the balls are white.
Two balls are taken from the bag, at random, without replacement.

(a) Complete the tree diagram.



[2]

(b) The probability that both balls are white is $\frac{1}{15}$.

Show that $n^2 - n - 90 = 0$.

[2]

(c) Find the value of n.

Answer ..... [2]

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