Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

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

Paper 1 **October/November 2016**

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.

DC (ST/SW) 123264/3

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[Turn over

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

1 **(a)** Evaluate $9.03 - (4.273 + 2.3)$.

Answer ..... [1]

(b) Evaluate $\frac{8}{9} - \frac{6}{7}$.

Answer ..... [1]

---

2 Given that $192 \times 64.3 = 12\,345.6$, **write down** the values of

(a) 0.192×643 ,

Answer ..... [1]

(b) $\frac{12.3456}{192}$.

Answer ..... [1]

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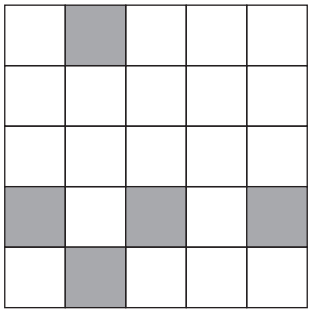
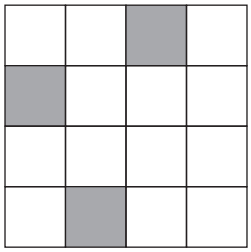
3 **(a)**



In the diagram, five small squares are shaded.

Shade **one more** small square, so that the diagram has exactly one line of symmetry. [1]

(b)



In the diagram, three small squares are shaded.

Shade **one more** small square, so that the diagram has rotational symmetry of order 4. [1]

4 **(a)** The total cost of 3 pencils is \$1.23 .

Find the total cost of 5 pencils.

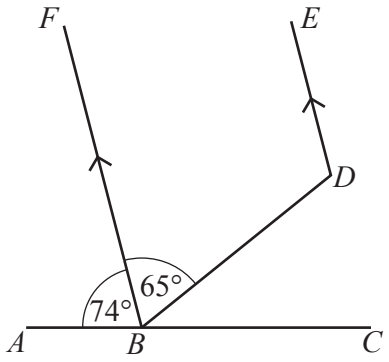
Answer \$ ..... [1]

(b) Arrange the following in order, starting with the smallest.

$$74\% \qquad -0.7 \qquad 0.\dot{7} \qquad -\frac{3}{4}$$

Answer ..... , ... , ... , ... [1]
smallest

5



In the diagram, ABC is a straight line and BF is parallel to DE.
$F\hat{B}A = 74°$ and $D\hat{B}F = 65°$.

(a) Find $C\hat{B}D$.

Answer $C\hat{B}D =$ ..... [1]

(b) Find reflex $B\hat{D}E$.

Answer reflex $B\hat{D}E =$ ..... [1]

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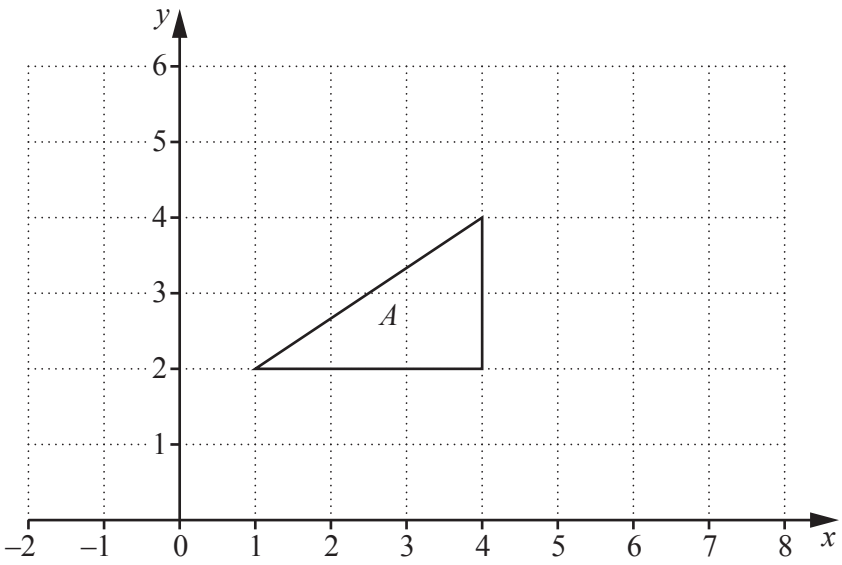
6 By making suitable approximations, estimate the value of $\dfrac{\sqrt{3.98} \times 602.3}{2.987}$.

Show clearly the approximations you use.

Answer ..... [2]

7



The diagram shows triangle A.
Triangle A is mapped onto triangle B by an enlargement.
The enlargement has centre (3, 3) and scale factor −2.

Draw and label triangle B. [2]

---

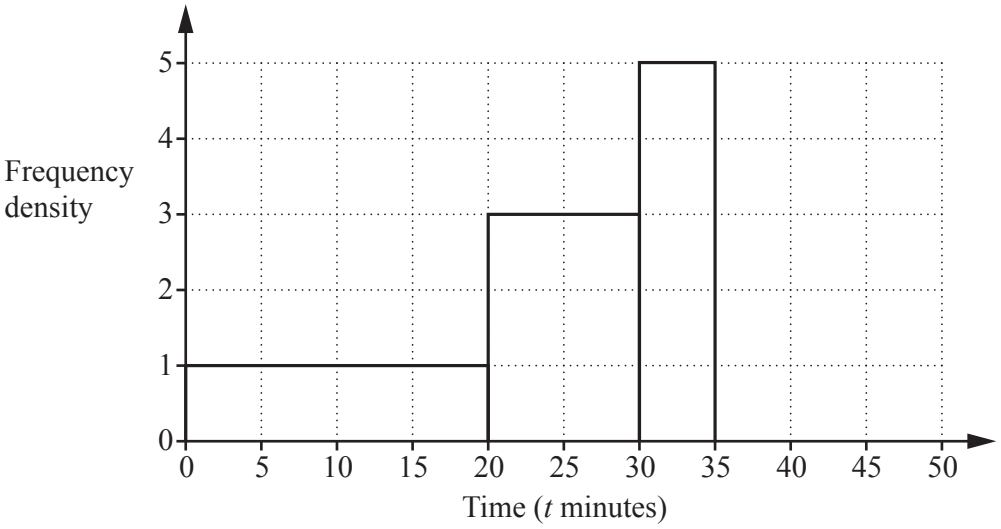
8 **(a)** Write the number 513 000 in standard form.

Answer ..... [1]

(b) Expressing your answer in standard form, evaluate $(4 \times 10^{-5}) \times (6 \times 10^{-4})$.

Answer ..... [2]

9



The diagram shows part of the histogram which represents the distribution of times taken by some people to travel to work.

(a) Complete the table.

Time (t minutes)	$0 < t \leqslant 20$	$20 < t \leqslant 30$	$30 < t \leqslant 35$	$35 < t \leqslant 50$
Frequency		30		30

[2]

(b) Complete the histogram. [1]

---

10 $f(x) = 4 + 3x$

(a) Find $f\left(-2\frac{1}{2}\right)$.

Answer ..... [1]

(b) Find $f^{-1}(5)$.

Answer ..... [2]

---

11 y varies inversely as the square of x.

(a) When $x = 2$, $y = 9$.

Find the value of y when $x = 3$.

Answer $y =$ ..... [2]

(b) When $x = n$, $y = p$.

Write down an expression for y, in terms of p, when $x = 2n$.

Answer ..... [1]

---

12 A school recorded the number of absent students over a 50-day period.
The results are given in the table.

Number of absent students	0	1	2	3	4	5 or more
Number of days	25	15	6	3	1	0

(a) Write down the mode.

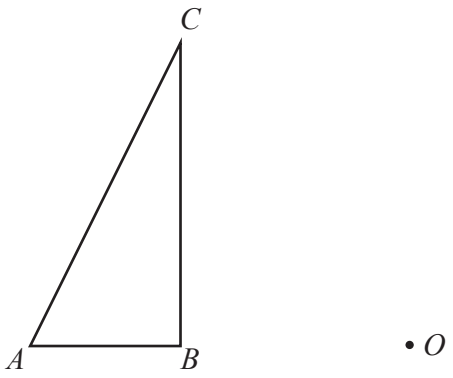
Answer ..... [1]

(b) Calculate the mean.

Answer ..... [2]

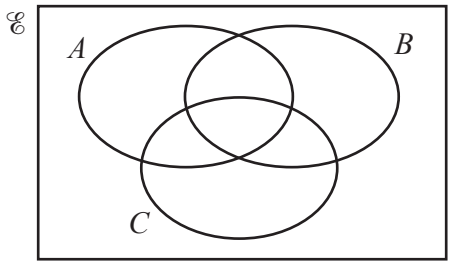
13 Triangle ABC is mapped onto triangle $A'B'C'$ by a rotation, centre O, through 110° clockwise.

Draw and label triangle $A'B'C'$.



[3]

14 **(a)** In the Venn diagram, shade the region which represents the subset $(A \cap B') \cup C$.



[1]

(b) In a group of 36 students,

23 study Spanish,
17 study French,
4 study neither Spanish nor French.

By drawing a Venn diagram, or otherwise, find the number of students who study both Spanish and French.

Answer ..... [2]

---

15 Solve the simultaneous equations.

$$3x + y = 9$$
$$2x + 3y = -8$$

Answer $x =$ .....

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

---

16 **(a)** Evaluate $3^2 + 3^1 + 3^0$.

Answer ..... [1]

(b) Evaluate $\left(\frac{4}{3}\right)^{-2}$.

Answer ..... [1]

(c) Simplify $(16y^6)^{\frac{1}{2}}$.

Answer ..... [1]

---

17 **(a)** Some money is shared between Ali, Ben and Carl in the ratio 5 : 3 : 2.
Ben receives \$60.

How much money is shared?

Answer \$ ..... [1]

(b) Express the ratio $3\frac{1}{2}$ hours : 14 minutes in the form k : 1.

Answer ..... : 1 [2]

18

Four cards are marked with the numbers 1, 2, 3 and 4.
One card is chosen at random.
A second card is then chosen, at random, from the remaining three cards.
The sum of the numbers on the two chosen cards is calculated.

(a) Complete the table to show the possible outcomes.

Second card \ First card	**1**	**2**	**3**	**4**
1				
2				
3				
4				

[1]

(b) What is the probability that the sum is less than 2?

Answer ..... [1]

(c) What is the probability that the sum is greater than 5?

Answer ..... [1]

---

19 A box has a mass of 1.7 kg, correct to the nearest 0.1 kg.

(a) Write down the lower bound for the mass of the box.

Answer ..... kg [1]

(b) The box holds 100 jars.
Each jar has a mass of 140 grams, correct to the nearest 10 grams.

Calculate the lower bound of the **total** mass of the box and 100 jars.
Give your answer in kilograms.

Answer ..... kg [2]

---

20 Solve the equation $\frac{2x-1}{4}+\frac{x-2}{3}=2$.

Answer $x =$ ..... [3]

21 [The volume of a sphere is $\frac{4}{3}\pi r^3$]

During a storm, raindrops fall into a cylinder which stands on horizontal ground.
The cylinder was empty before the storm started.

The cylinder has radius 20 mm.
Each raindrop is a sphere of radius 2 mm.
After the storm, the depth of water in the cylinder is 16 mm.

Calculate the number of raindrops that fell into the cylinder.

Answer ..... [3]

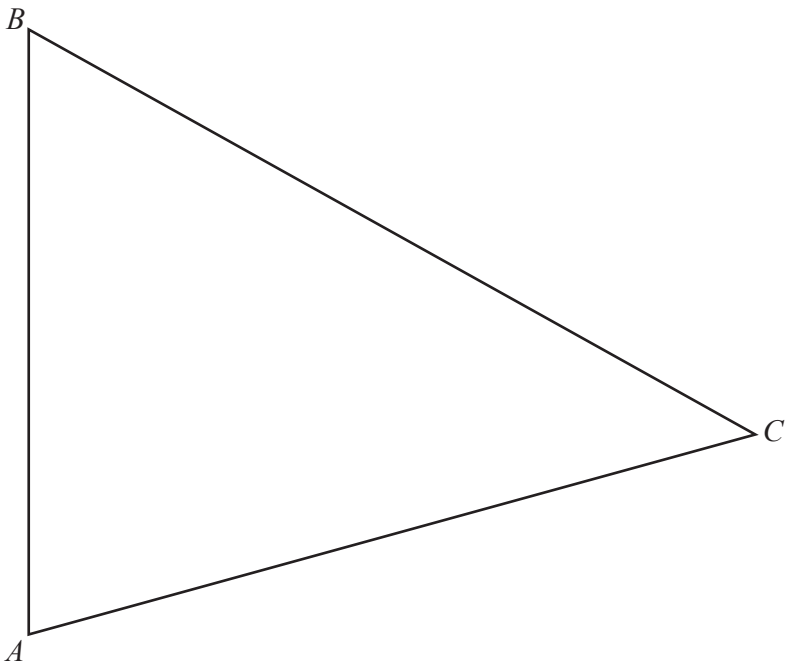
22 The diagram shows triangle ABC.

(a) Construct the locus of points, **inside** triangle ABC, that are equidistant from A and B. [1]

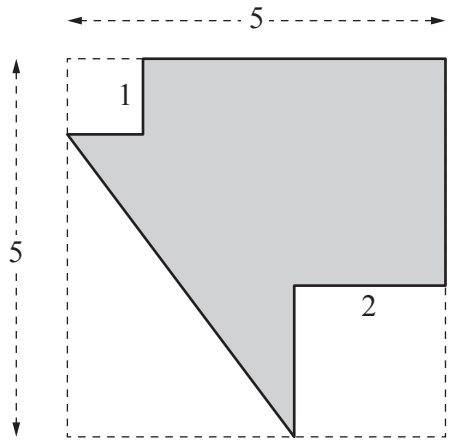
(b) Construct the locus of points, **inside** triangle ABC, that are equidistant from AB and BC. [1]

(c) On the diagram, shade the region **inside** triangle ABC which contains the points that are

nearer to A than to B and
nearer to BC than AB. [1]



23



The diagram shows a square piece of card, from which a triangle and two small squares are removed. All lengths on the diagram are in centimetres.

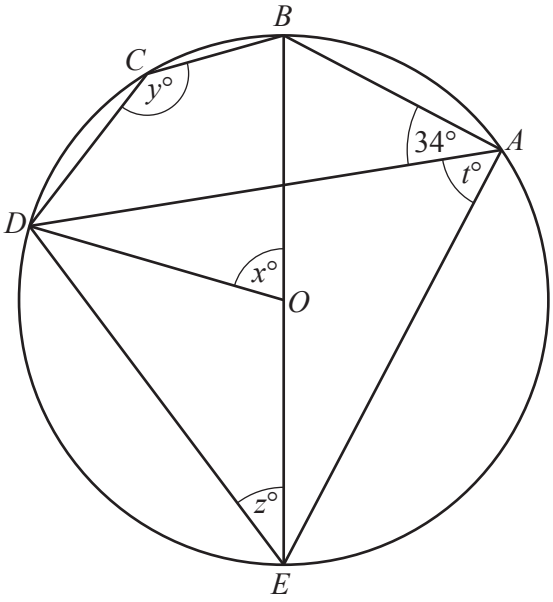
(a) Calculate the area of the shaded card.

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

(b) Calculate the perimeter of the shaded card.

Answer ..... cm [2]

24



In the diagram, A, B, C, D and E lie on the circle, centre O.
BOE is a straight line.
$D\hat{A}B = 34°$.

(a) Find x.

Answer $x =$ ..... [1]

(b) Find y.

Answer $y =$ ..... [1]

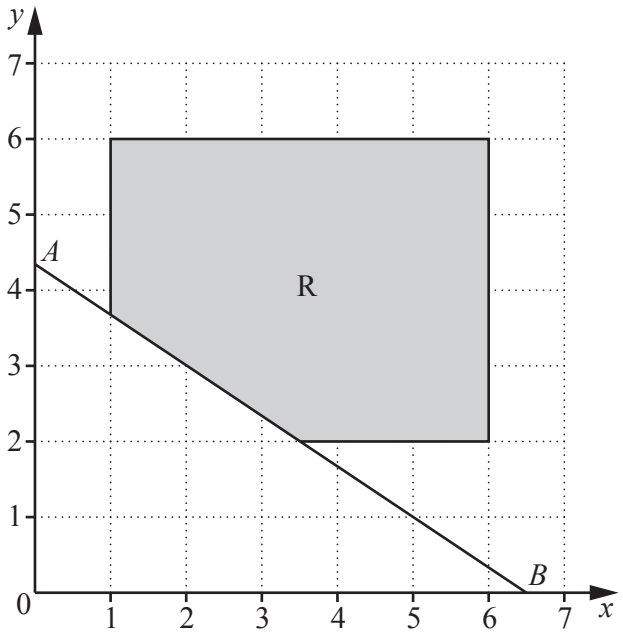
(c) Find z.

Answer $z =$ ..... [1]

(d) Find t.

Answer $t =$ ..... [1]

25



In the diagram, the line $3y + 2x = 13$ meets the axes at A and B.

(a) Find the coordinates of A.

Answer (..... , ...) [1]

(b) The shaded region R is defined by five inequalities.
Two of these are $x \leqslant 6$ and $y \leqslant 6$.

Write down the other three inequalities.

Answer .....

.....

..... [2]

(c) The point P is in the shaded region R.

Given that AP is as large as possible, write down the coordinates of P.

Answer (..... , ...) [1]

26 Two sequences have 1, 3, 5 as their first three terms.

(a) In the first sequence, each term is 2 more than the term before it.

(i) Find an expression, in terms of n, for the nth term.

Answer ..... [1]

(ii) The kth term of this sequence is 841.

Find the value of k.

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

(b) The nth term of the second sequence is

$$2^{n-1} - \frac{(n-1)(n-4)}{2}.$$

(i) Find the fourth term of this sequence.

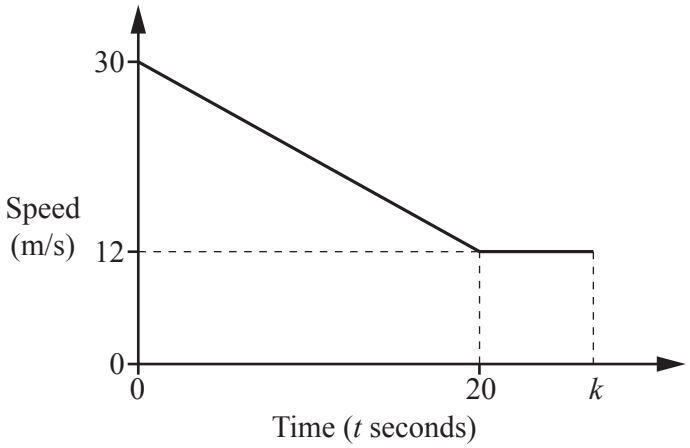
Answer ..... [1]

(ii) Find the fifth term of this sequence.

Answer ..... [1]

Question 27 is printed on the next page

27



The diagram shows the speed-time graph of a car which slows down from 30 m/s to 12 m/s in 20 seconds, and then continues at a speed of 12 m/s.

(a) Find the retardation when $t = 10$.

Answer ..... m/s^2 [1]

(b) Find the distance travelled by the car between $t = 0$ and $t = 20$.

Answer ..... m [2]

(c) The distance travelled by the car between $t = 20$ and $t = k$ is 60 m.

Find the value of k.

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