



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER



**MATHEMATICS (SYLLABUS D)**  
Paper 1

**4024/11**  
**May/June 2012**  
**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 a pencil for any diagrams or graphs.  
Do not use staples, paper clips, highlighters, 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.**

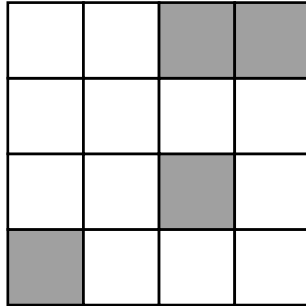
The number of marks is given in brackets [ ] at the end of each question or part question.  
The total of the marks for this paper is 80.

This document consists of **20** printed pages.

**ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.**

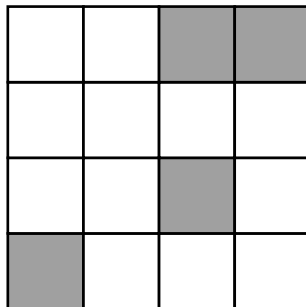
*For  
Examiner's  
Use*

- 1 (a) On the diagram below, shade two more squares to make a pattern that has rotational symmetry of order 2.



[1]

- (b) On the diagram below, shade two more squares to make a pattern that has only one line of symmetry.



[1]

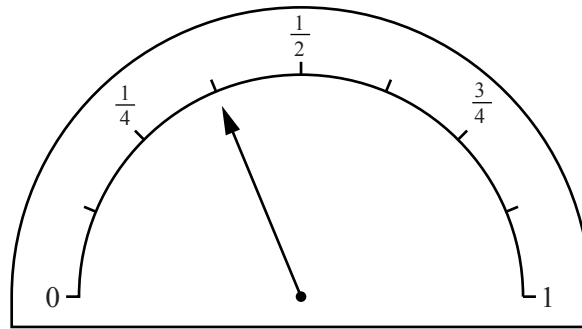
- 2 (a) Evaluate  $8 - 5 \times 4 + 3$ .

*Answer* ..... [1]

- (b) Express 1.03 as a percentage of 1.

*Answer* .....% [1]

- 3 (a) The diagram shows the fuel gauge in Abid's car.

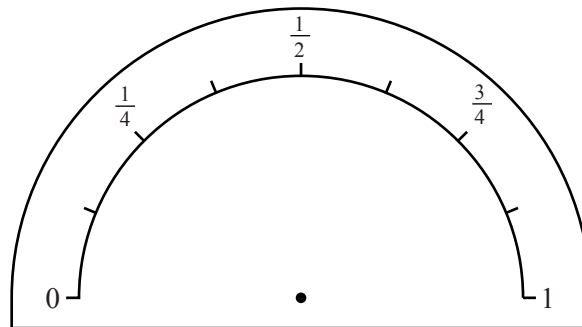


The tank contains 50 litres when it is full.

Estimate the number of litres in the tank.

Answer ..... litres [1]

- (b) The diagram shows the fuel gauge in Ben's car.



Draw an arrow on the gauge above to indicate that the tank is approximately  $\frac{4}{5}$  full.

[1]

- 4 Factorise completely

(a)  $12x^2 - 15x^3$ ,

Answer ..... [1]

(b)  $x^2 - x - 6$ .

Answer ..... [1]

5 An empty lorry has a mass of 4.3 tonnes, correct to the nearest tenth of a tonne.

(a) What is the lower bound for the mass of the empty lorry?

*Answer* .....tonnes [1]

(b) The total mass of the lorry and its load is 6.8 tonnes, correct to the nearest tenth of a tonne.

Find the upper bound for the mass of the load.

*Answer* .....tonnes [1]

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6 Given that  $\pi = 3.141592654$ , find the difference between  $\frac{22}{7}$  and  $\pi$ , correct to two significant figures.

Show your working.

*Answer* ..... [2]

*For  
Examiner's  
Use*

- 7 (a) Jane puts some red balloons and some blue balloons into a bag.  
The ratio of red balloons to blue balloons is 3 : 4.  
There are 84 balloons in the bag.

How many blue balloons are in the bag?

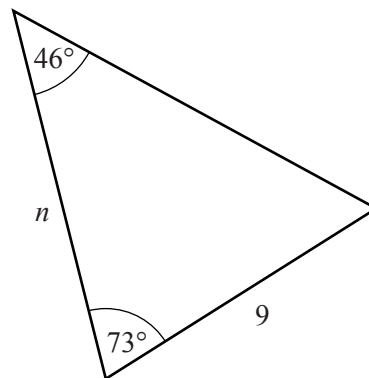
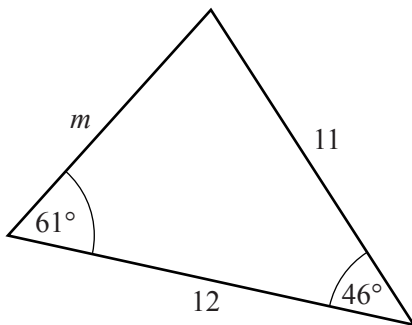
Answer ..... [1]

- (b) At a party the ratio of boys to girls is 5 : 4.  
There are 40 boys at the party.

Find the total number of children at the party.

Answer ..... [1]

- 
- 8 These two triangles are congruent.  
The lengths are in centimetres.



Find  $m$  and  $n$ .

Answer  $m =$  .....

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

- 9 Buses following route A leave the bus station every five minutes.  
Buses following route B leave the bus station every six minutes.  
Buses following route C leave the bus station every nine minutes.  
Three buses, following routes A, B and C, leave together at 13 00.

For  
Examiner's  
Use

What is the next time when buses following all three routes leave the bus station together?

*Answer* ..... [2]

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- 10 Solve the simultaneous equations.

$$\begin{aligned}3x + 5y &= 0 \\2x - 3y &= 19\end{aligned}$$

*Answer*  $x =$  .....

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

---

11 Evaluate

(a)  $\frac{3}{5} - \frac{2}{7}$ ,

Answer ..... [1]

(b)  $1\frac{2}{3} \div 1\frac{3}{4}$ .

Answer ..... [2]

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12

0.2	2	$\sqrt{2}$	$\frac{1}{3}$	0.83	8	81
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From the numbers listed above, write down

(a) a prime number,

Answer ..... [1]

(b) a cube number,

Answer ..... [1]

(c) an irrational number.

Answer ..... [1]

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**13** Gill swims lengths of the swimming pool.  
The pool is 25 m long and she swims a total of 1.6 km.

**(a)** How many lengths of the pool does she swim?

*Answer* ..... [1]

**(b)** Gill swims for  $1\frac{1}{4}$  hours and ends her swim at 11 05.

**(i)** At what time did she begin her swim?

*Answer* ..... [1]

**(ii)** What is her average speed, in kilometres per hour?

*Answer* ..... km/h [1]

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14 Sachin and Zaheer play a game of tennis and a game of badminton.  
The results of the games are independent and the games cannot be drawn.  
The probability that Sachin wins the game of tennis is  $\frac{3}{4}$ .

The probability that Zaheer wins the game of badminton is  $\frac{3}{5}$ .

(a) What is the probability that Sachin wins both games?

*Answer* ..... [1]

(b) What is the probability that Zaheer wins just one of the games?

*Answer* ..... [2]

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15 (a) Write  $8^3$  in the form  $2^k$ .

Answer ..... [1]

(b) Evaluate  $\frac{9 \times 2^{12} - 3 \times 2^{10}}{3 \times 2^8}$ .

Answer ..... [2]

16 (a) The profits of a company were \$5 million in 2009 and \$8 million in 2010.

Find the percentage increase in profits from 2009 to 2010.

Answer .....% [1]

(b) Another company had an income of \$20 million in 2008.  
In 2009 this income decreased by 10%.  
In 2010 the income increased by 15% from the 2009 income.

Find the income in 2010.

Answer \$ ..... million [2]

17 A swarm of locusts contains 40 billion locusts.  
A billion is a thousand million.

(a) Write down, in standard form, the number of locusts in this swarm.

*Answer* ..... [1]

(b) Each locust eats 2 grams of food every day.

Find the amount of food eaten by this swarm in one week.  
Give your answer in **kilograms** using standard form.

*Answer* ..... kg [2]

---

18 Solve

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

*Answer*  $x = \dots\dots\dots$  [1]

(b)  $3 - y \leq 1$ ,

*Answer*  $\dots\dots\dots$  [1]

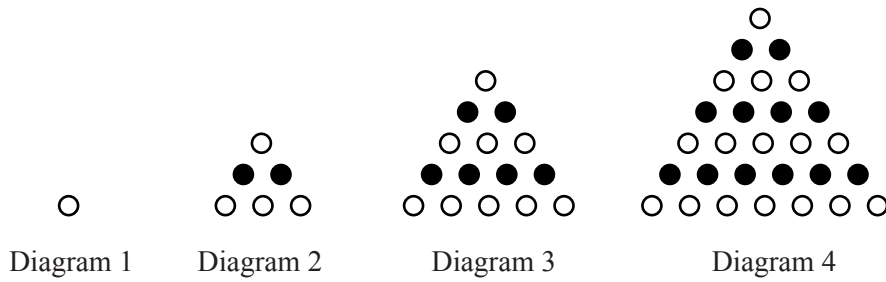
(c)  $\frac{2t-1}{4} = \frac{1-t}{3}$ .

*Answer*  $t = \dots\dots\dots$  [2]

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*For  
Examiner's  
Use*

19 A sequence of diagrams is made using black and white counters.



The number of black and white counters in each diagram is shown in the table below.

Diagram number	1	2	3	4	5	6
Number of white counters	1	4	9	16		
Number of black counters	0	2	6	12		

- (a) Complete the table for Diagrams 5 and 6. [1]
- (b) Write an expression, in terms of  $n$ , for the number of **white** counters in the  $n$ th diagram.

Answer ..... [1]

- (c) By considering the number patterns in the table, write an expression, in terms of  $n$ , for the number of **black** counters in the  $n$ th diagram.

Answer ..... [1]

- (d) What is the **total** number of counters in the 20th diagram?

Answer ..... [1]

20 Here are the equations of four straight lines.

- Line 1:  $y = 2x + 4$   
Line 2:  $y = 2 - x$   
Line 3:  $y = 2x - 1$   
Line 4:  $2y - 8 = 3x$

For  
Examiner's  
Use

(a) Which two lines are parallel?

*Answer* Line ..... and Line ..... [1]

(b) Which two lines intersect the  $y$ -axis at the same point?

*Answer* Line ..... and Line ..... [1]

(c) Which line passes through the points (1, 1) and (−3, 5)?

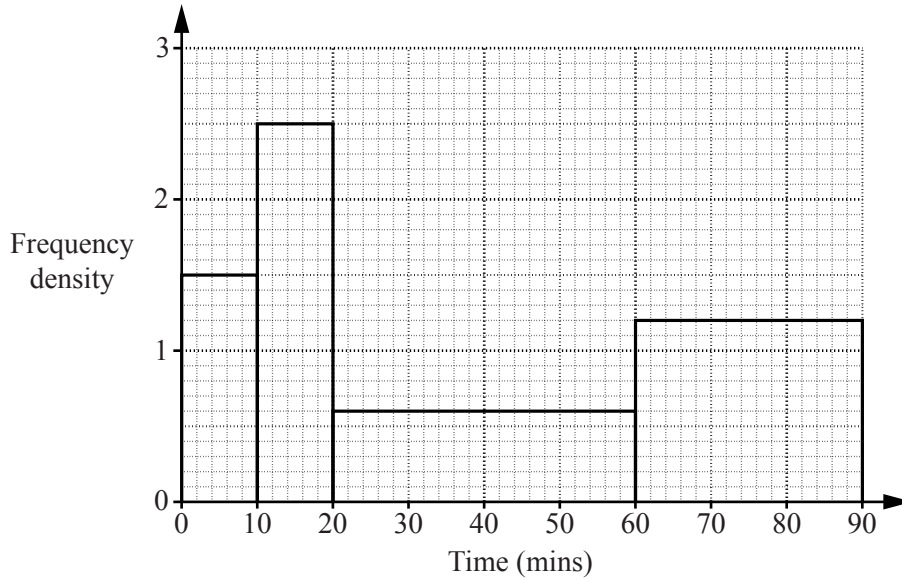
*Answer* Line ..... [1]

(d) Find the midpoint of the line segment joining (1, 1) and (−3, 5).

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

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- 21 A group of 100 students was asked how many minutes each spent talking on their mobile phone during one day.  
The histogram summarises this information.



(a) Use the histogram to

- (i) find the number of students who spent between 0 and 10 minutes talking on their mobile phone,

Answer ..... [1]

- (ii) estimate the number of students who spent between 25 and 65 minutes talking on their mobile phone.

Answer ..... [2]

(b) A pie chart is drawn to represent the information shown in the histogram.

Calculate the angle of the sector that represents the students who spent between 0 and 10 minutes talking on their mobile phone.

Answer ..... [1]

22  $\frac{1}{b} = \frac{1}{c} + \frac{1}{d}$

(a) Evaluate  $b$  when  $c = 3$  and  $d = 8$ .

*For  
Examiner's  
Use*

*Answer b =* ..... [2]

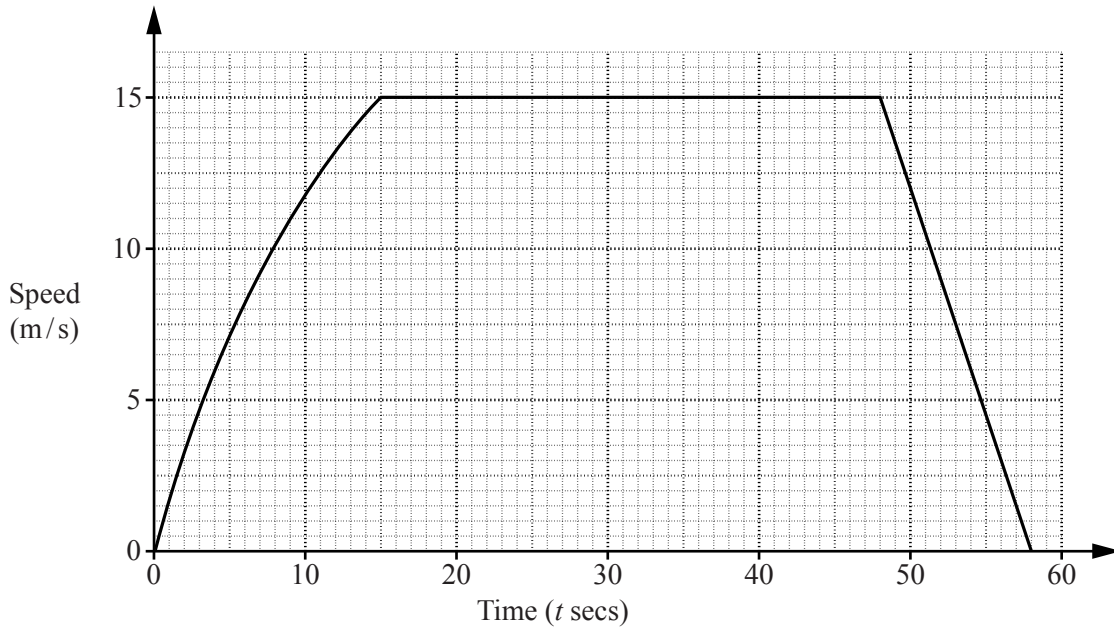
(b) Rearrange the formula to make  $d$  the subject.

*Answer d =* ..... [3]

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23 The diagram shows the speed-time graph of a car travelling between two road junctions.



(a) Calculate the retardation of the car between  $t = 48$  and  $t = 58$ .

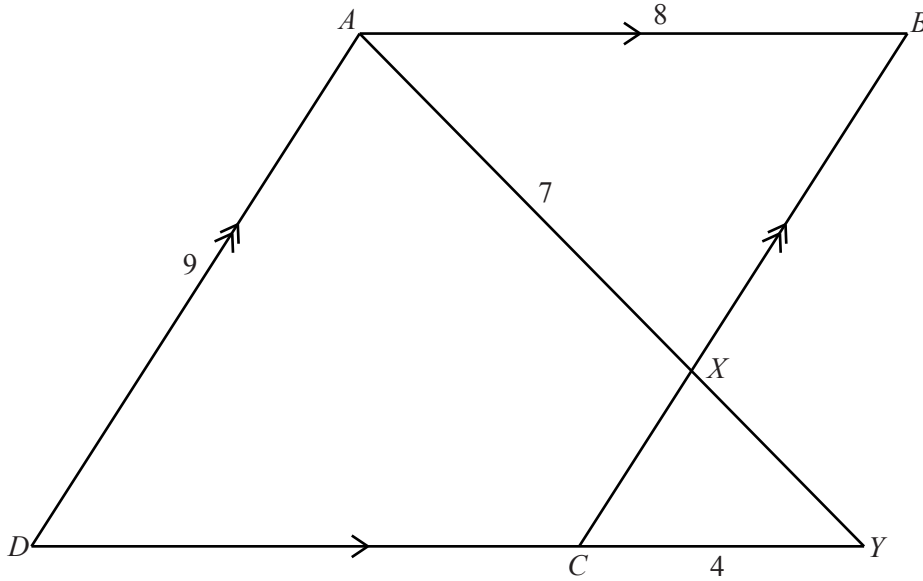
Answer .....m/s<sup>2</sup> [1]

(b) By drawing a tangent, estimate the acceleration of the car when  $t = 8$ .

Answer .....m/s<sup>2</sup> [2]

(c) Calculate the distance travelled by the car between  $t = 15$  and  $t = 58$ .

Answer .....m [2]



In the diagram,  $ABCD$  is a parallelogram.  
 $X$  is a point on  $BC$ .  
 $AXY$  and  $DCY$  are straight lines.  
 $AB = 8$  cm,  $AX = 7$  cm,  $AD = 9$  cm and  $CY = 4$  cm.

- (a) Show that triangles  $ABX$  and  $YDA$  are similar.  
 Give the reason for each of your statements.

.....

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.....[2]

(b) Calculate  $AY$ .

*For  
Examiner's  
Use*

*Answer* ..... cm [2]

(c) Calculate  $CX$ .

*Answer* ..... cm [2]

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**Question 25 is printed on the following page.**

25

$$f(x) = 6x^2 - x + 3$$

For  
Examiner's  
Use

(a) Find

(i)  $f(2)$ ,

*Answer*  $f(2) = \dots\dots\dots [1]$

(ii)  $f(-1)$ ,

*Answer*  $f(-1) = \dots\dots\dots [1]$

(iii) the values of  $x$  for which  $f(x) = 5$ .

*Answer*  $x = \dots\dots\dots$  or  $\dots\dots\dots [2]$

(b) Write down and simplify an expression for  $f(a + 1)$ .

*Answer*  $f(a + 1) = \dots\dots\dots [2]$

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