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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

MATHEMATICS (SYLLABUS D) **4024/11**

Paper 1 **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.

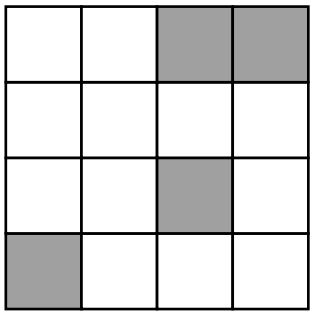
ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

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.

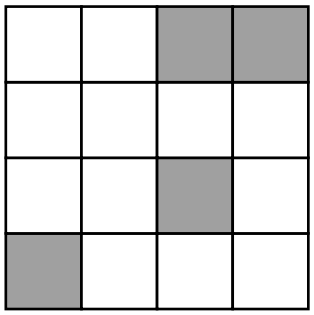
ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

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]

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

Answer .....[1]

(b) Express 1.03 as a percentage of 1.

Answer .....% [1]

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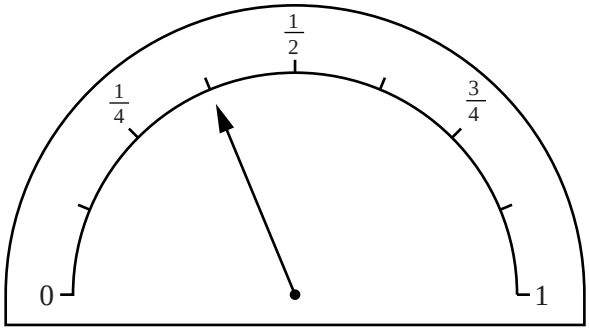
3 **(a)** The diagram shows the fuel gauge in Abid's car.

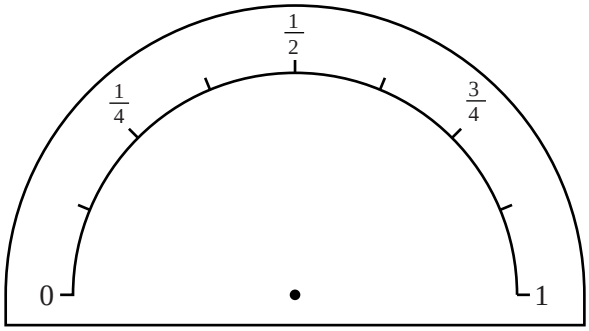


The tank contains 50 litres when it is full.

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]

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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 π, correct to two significant figures.

Show your working.

Answer .....[2]

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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]

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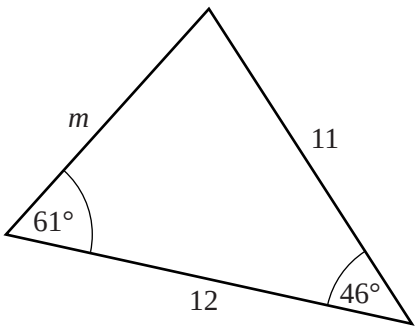
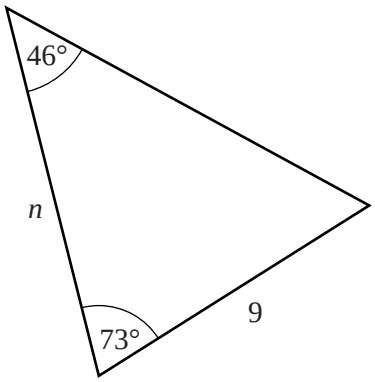
8 These two triangles are congruent.
The lengths are in centimetres.





Find *m* and *n*.

Answer *m* = ...

n = ...[2]

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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.

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

Answer .....[2]

---

10 Solve the simultaneous equations.

$$3x + 5y = 0$$
$$2x - 3y = 19$$

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]

12

0.2	2	$\sqrt{2}$	$\frac{1}{3}$	0.83	8	81

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]

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]

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

Answer .....[1]

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

Answer .....[2]

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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]

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

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

Answer .....[1]

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

Answer $t =$ .....[2]

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

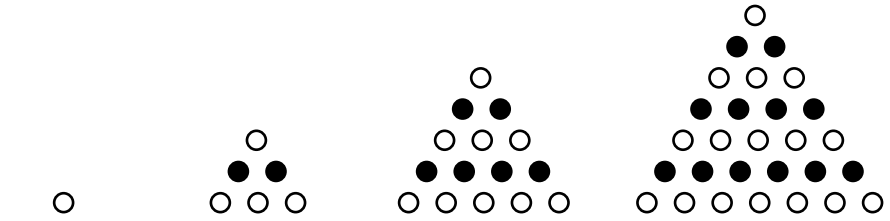


Diagram 1 Diagram 2 Diagram 3 Diagram 4

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: $2y - 8 = 3x$

(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]

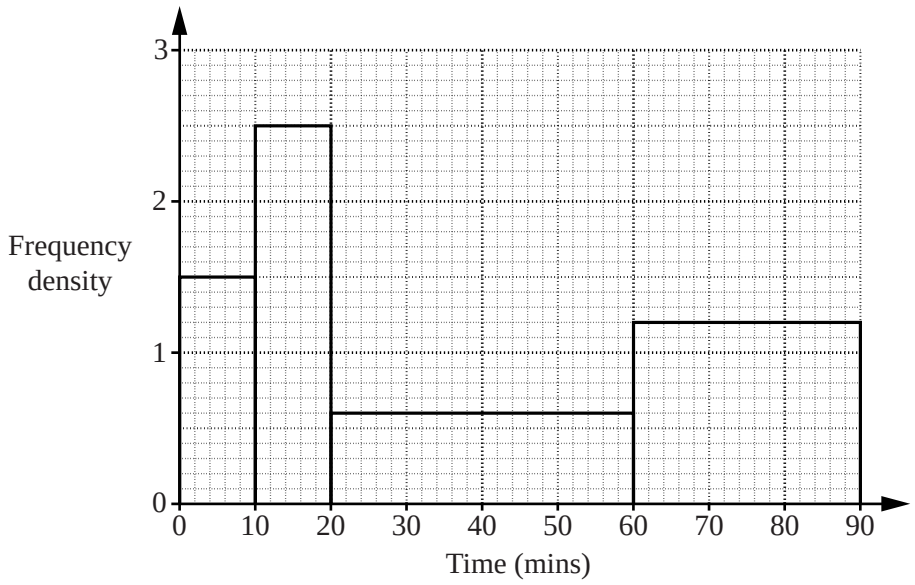
(c) Which line passes through the points (1, 1) and (–3, 5)?

Answer Line ..... [1]

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

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

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

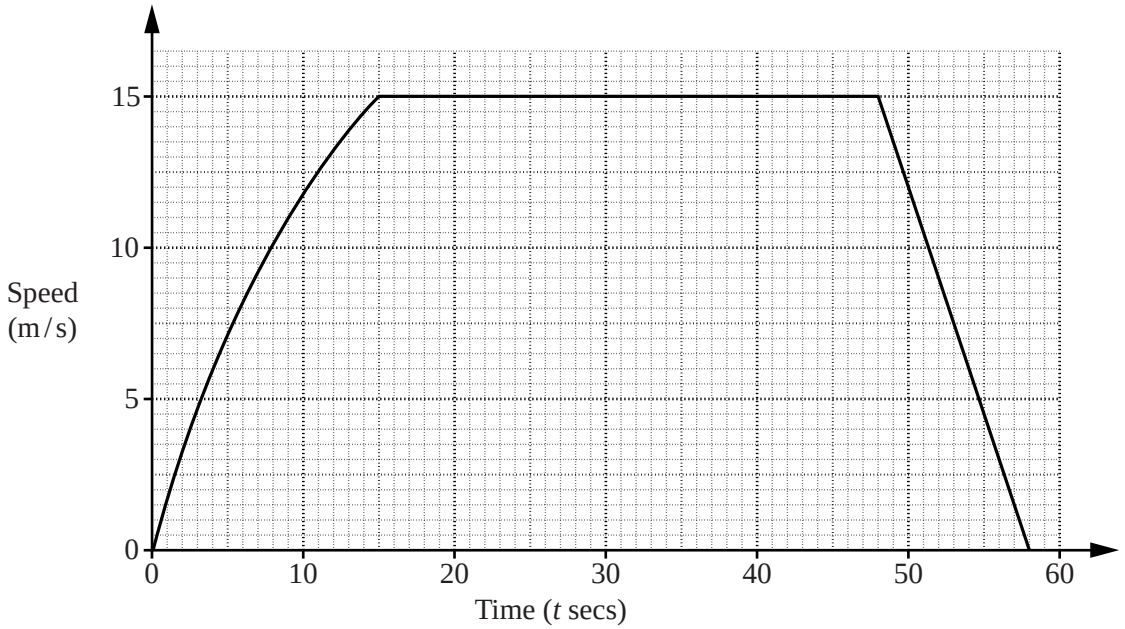
(a) Evaluate b when $c = 3$ and $d = 8$.

Answer $b =$ ..... [2]

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

Answer $d =$ ..... [3]

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^2 [1]

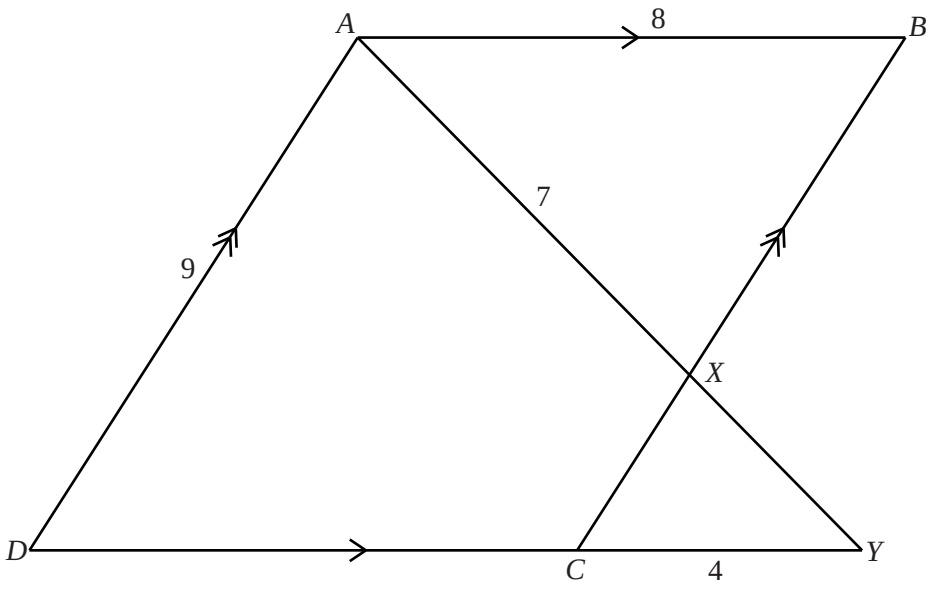
(b) By drawing a tangent, estimate the acceleration of the car when $t = 8$.

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

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

Answer .....m [2]

24



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*.

Answer ..... cm [2]

(c) Calculate *CX*.

Answer ..... cm [2]

Question 25 is printed on the following page.

25 $f(x) = 6x^2 - x + 3$

(a) Find

(i) f(2),

Answer f(2) = ...[1]

(ii) f(–1),

Answer f(–1) = ...[1]

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

Answer x = ... or .....[2]

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

Answer f(a + 1) = ...[2]