MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD
UNIVERSITY OF MALTA, MSIDA

SECONDARY EDUCATION CERTIFICATE LEVEL

SEPTEMBER 2017 SESSION

SUBJECT: Mathematics	**PAPER:** I – Section A (Non-Calculator Section)
DATE: 6th September 2017	**TIME:** 20 minutes

Attempt **ALL** questions.

Write your answers in the space available on the examination paper.
The use of calculators and protractors is **not** allowed.
It is not necessary to show your working.
This paper carries a total of 20 marks.

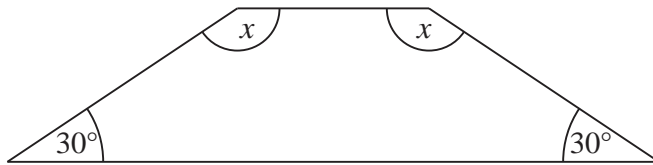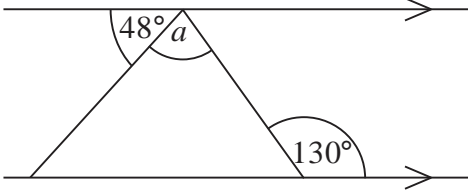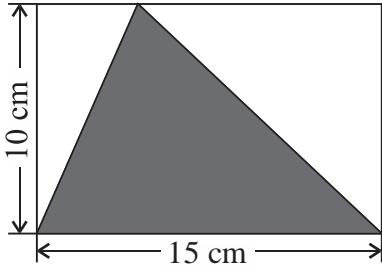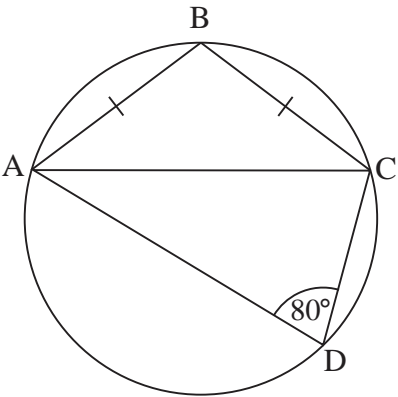| QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK	SPACE FOR ROUGH WORK (IF NECESSARY)
1 Determine the value of *x*. *Diagram not drawn to scale* **Ans** _____	
2 Which of the following letters have reflective symmetry? O, P, X, Y, S **Ans** _____	
3 A clock is 17 minutes fast. What time is shown on this clock when the correct time is 08:15? **Ans** _____	
4 Write the number **seven and a half million** in standard form. **Ans** _____	
5 The daily temperature recorded in a particular place during the first week of September is shown below. $-5\,°C,\ -3\,°C,\ 2\,°C,\ -2\,°C,\ 1\,°C,\ 0\,°C,\ 3\,°C$ Work out the range of these values. **Ans** _____	
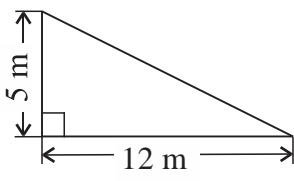
QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK	SPACE FOR ROUGH WORK (IF NECESSARY)
6 What is the Least Common Multiple of 16 and 12. Ans _____	
7 Use the diagram below to calculate the size of the angle marked *a*. *Diagram not drawn to scale* Ans _____	
8 Write the following numbers in order, starting with the smallest number. $$0.0077, \quad \frac{1}{2}, \quad 0.3, \quad 0.7$$ Ans _____ , _____ , _____ , _____	
9 Write the following expression in its simplest possible form. $$\frac{5x+3}{2} - \frac{x+1}{2}$$ Ans _____	
10 What is the value of *a* which satisfies these two equations? $$a + 4b = 7$$ $$a - 4b = 5$$ Ans _____	

DO NOT WRITE ABOVE THIS LINE

QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK	SPACE FOR ROUGH WORK (IF Necessary)
11 The diagram shows a rectangle. Work out the area of the shaded triangle. 10 cm 15 cm *Diagram not drawn to scale* **Ans** _____	
12 A shoe shop is offering a discount of 20% on the marked prices. How much is to be paid for a pair of sandals with a marked price of €45? **Ans** _____	
13 ABCD is a cyclic quadrilateral with AB = BC. Work out the size of ∠BAC. B A C 80° D *Diagram not drawn to scale* **Ans** _____	
14 Which of the following is the smallest number? $1, \ 10^{-5}, \ 10^{1}, \ 10^{-3}$ **Ans** _____	
15 Work out the value of $\dfrac{1}{2.5}$. Give your answer as a decimal number. **Ans** _____	

DO NOT WRITE ABOVE THIS LINE

QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK	SPACE FOR ROUGH WORK (IF NECESSARY)
16 Work out the value of this expression. $$\frac{11 \times 30 + 60}{15}$$ Ans _____	
17 Use the number line below to read the number indicated by the arrow. 750 1000 Ans _____	
18 One Australian Dollar (AUD) is about two thirds of a Euro. Estimate the value of €100 in AUD. Ans _____	
19 What is the length of the unknown side of this right-angled triangle? 5 m 12 m *Diagram not drawn to scale* Ans _____	
20 A worker has an eight hour shift that starts at 22:30. When he finishes work, he takes 45 minutes to arrive home. At what time does he arrive home, the next morning? Ans _____	

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

UNIVERSITY OF MALTA, MSIDA

SECONDARY EDUCATION CERTIFICATE LEVEL

SEPTEMBER 2017 SESSION

SUBJECT:	**Mathematics**
PAPER NUMBER:	I – Section B (Calculator Section)
DATE:	6th September 2017
TIME:	1hr and 45 minutes

Answer **ALL** questions.

Write your answers in the space available on the examination paper.

Show clearly all the necessary steps, explanations and construction lines in your working.

Unless otherwise stated, diagrams are drawn to scale.

The use of non-programmable electronic calculators with statistical functions and mathematical instruments is allowed.

Candidates are allowed to use transparencies for drawing transformations.

This paper carries a total of 80 marks.

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Sec A	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**Total**

1   (a)   Simplify $4a - 3b + 9a - 5b$

(1)

(b)   Expand $3x(2 + x)$

(2)

(c)   Factorise $5a + 125$

(1)

(d)   Solve $7r + 5 = 9 - r$

(2)

(e)   The time T in seconds for a full swing of a pendulum of length L (in metres) is given by the equation

$$T = 2\pi\sqrt{\frac{L}{9.8}}$$

Work out the value of T when $L = 0.9$ m.

(2)

(Total: 8 marks)

2   Vanessa works 8 hours a day on Monday, Tuesday and Wednesday, and 6 hours a day on Thursday and Friday. She earns €270 a week.

(a)   How much does she earn in euro per hour?

(3)

(b)   Vanessa pays 10% of her wage on National Insurance. What is her annual salary after National Insurance is deducted?

(3)

(Total: 6 marks)

3   A blue dice and a red dice are tossed together.

(a)   Complete the table below to show the set of all possible outcomes.

Number on the Blue Dice

	1	2	3	4	5	6
1	(1, 1)	(2, 1)	(3, 1)	(4, 1)		
2	(1, 2)	(2, 2)	(3, 2)	(4, 2)		
3	(1, 3)	(2, 3)	(3, 3)	(4, 3)		
4	(1, 4)	(2, 4)	(3, 4)	(4, 4)		
5	(1, 5)	(2, 5)	(3, 5)	(4, 5)		
6	(1, 6)	(2, 6)	(3, 6)	(4, 6)		

Number on the Red Dice

(2)

(b)   What does the entry (2, 6) in the table above represent?

(1)

(c)   What is the probability that both dice show the same number?

(2)

(d)   The Total Score is the sum of the scores on the two dice.
        Which Total Score is most likely? What is the probability of obtaining this Total Score?

(3)
(Total: 8 marks)

4   Katia and Franco go to a confectionery.

Katia gets 4 cheesecakes and 2 pies for €4.
Franco gets 6 cheesecakes and 4 pies for €7.20.

If c stands for the cost, in cents, of a cheesecake
and p stands for the cost, in cents, of a pie, write
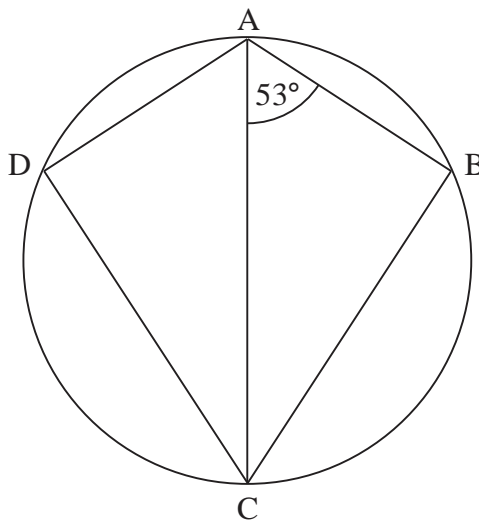two equations involving c and p.

Use your equations to work out the cost of a cheesecake and the cost of a pie.

(Total: 6 marks)

5   In the figure below, AC is a line of symmetry and the vertices of the quadrilateral ABCD lie
on a circle. Angle BAC is equal to 53°.

Diagram not drawn to scale

Work out the size of the following angles.
In each case, give a reason for your answer.
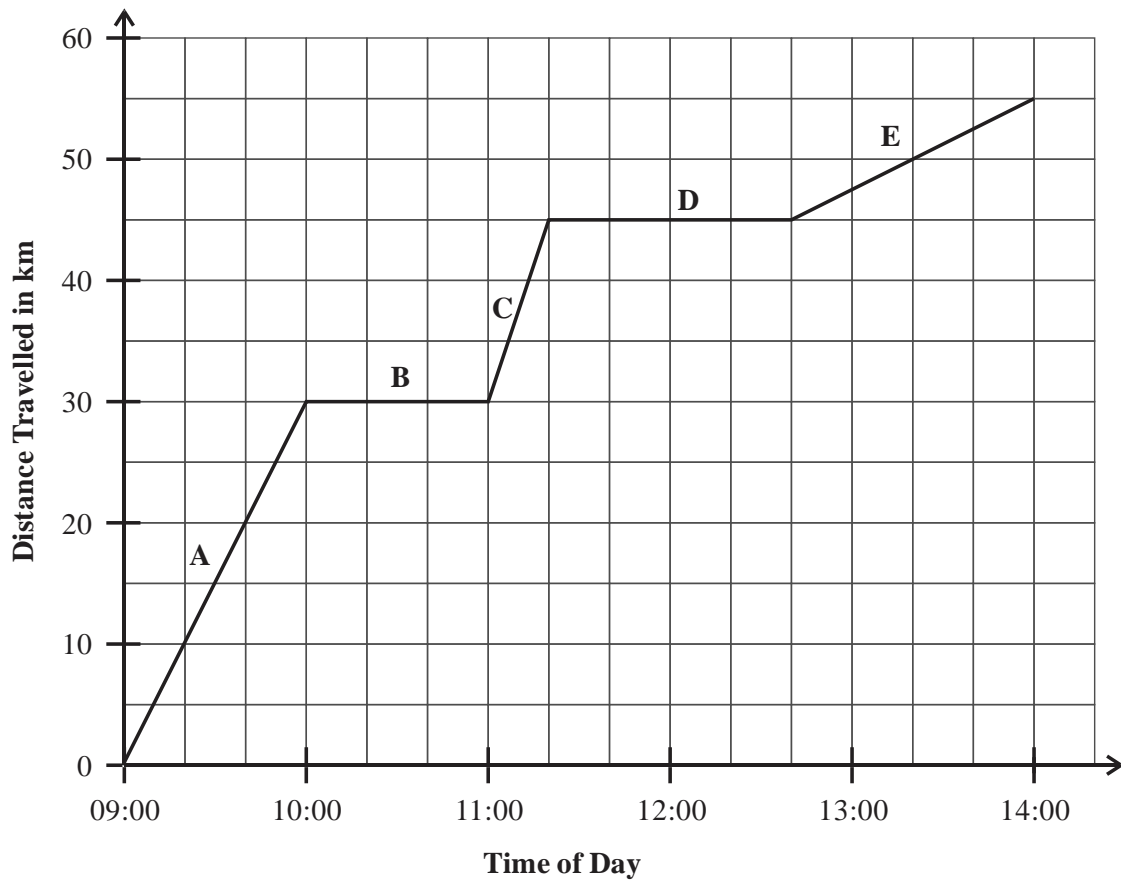
(a)   ∠DAC

(2)

(b)   ∠ABC

(2)

(c)   ∠ACD

(2)

(d)   ∠ABD

(2)
(Total: 8 marks)

6   On her last day in the U.K., Jane left her hotel by car at 09:00. On her way to the airport, she visited two shops. The distance-time graph shows her journey.

(a)   How much time did she spend visiting the two shops?

(2)

(b)   What distance was travelled to go from one shop to the other?

(1)

(c)   How many kilometres did she travel altogether to reach the airport?

(1)

(d)   What was her speed in km/h during Part E of her journey?

(2)

(e)   During which part of the journey was her speed the fastest? Explain your reasoning.

(3)
(Total: 9 marks)

7   The diagram shows a running track.
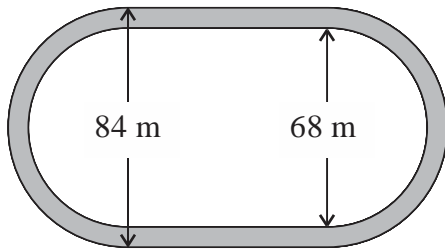
84 m   68 m

Diagram not drawn to scale

The perimeter of the track is made up of straight lines and semicircles.
The length of the outer perimeter is 400 m.
The diameter of the outer semicircle is 84 m.

(a)   Find the length of **ONE** straight section of the track.
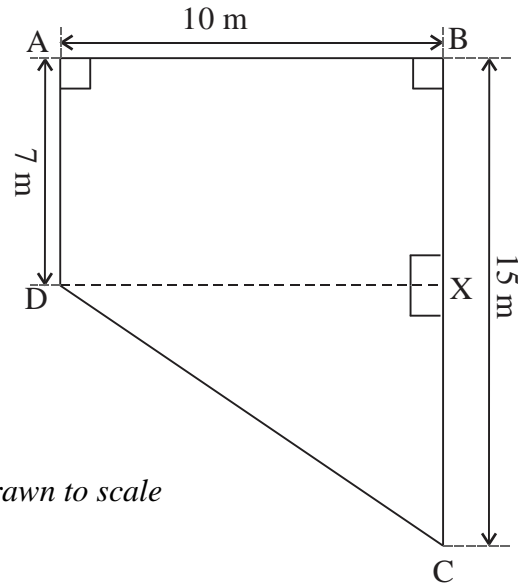
(3)

The diameter of the inner semicircle is 68 m.
(b)   Find the area of the track (the shaded area).

(5)
(Total: 8 marks)

8   The diagram shows a hall ABCD where ∠DAB and ∠ABC are both right angles.
     X is a point on BC so that the line DX is perpendicular to BC.

     (a)   Give a reason why DX is 10 m long.

Diagram not drawn to scale

(1)

     (b)   Work out the length of CD in metres, correct to one decimal place.
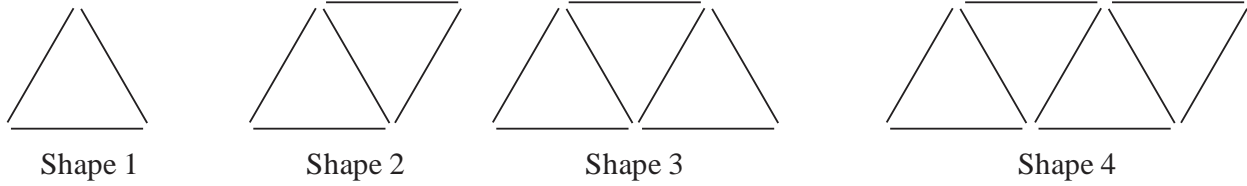
(3)

     (c)   Work out the size of ∠BCD.

(3)

     (d)   Work out the size of ∠ADC.

(2)

(Total: 9 marks)

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9   A sequence of shapes is made from sticks.

Shape 1   Shape 2   Shape 3   Shape 4

(a)   Complete the table below for the number of sticks in different shapes.

Number of Sticks for Different Shapes

Shape Number	1	2	3	4	5	10	n
Number of sticks	3						

(4)

(b)   Which of the following statements is correct?
       Mark this statement by placing a tick (✓) in the adjacent box.

           The number of sticks in each shape of the sequence is:

       Always even   ☐

       Always odd   ☐

       Sometimes even and sometimes odd   ☐

(1)

(c)   What is the shape number of the shape which is made up of 3001 sticks?

(2)
(Total: 7 marks)

10 (a) Maria mixed bleaching liquid with water to make two mixtures.

Mixture **A**: 2 parts bleaching liquid and 5 parts water
Mixture **B**: 3 parts bleaching liquid and 8 parts water

Which mixture is more concentrated? Show your working.

(3)

(b) A sum of money is to be divided among three people.
John will take half the sum.
Maria will take twice as much as Sandra.
Work out the ratio:
John's share: Maria's share: Sandra's share

(3)

(Total: 6 marks)

11   A motorist makes a journey of 200 km. Over the first 50 km, the motorist drives at an average speed of 40 km/h. Over the rest of the journey, he drives at an average speed of 80 km/h.

Work out the average speed of the motorist over the whole journey.

(Total: 5 marks)

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD
UNIVERSITY OF MALTA, MSIDA

SECONDARY EDUCATION CERTIFICATE LEVEL

SEPTEMBER 2017 SESSION

SUBJECT:	**Mathematics**
PAPER NUMBER:	IIB
DATE:	6th September 2017
TIME:	4:00 p.m. to 6:05 p.m.

Answer **ALL** questions.

Write your answers in the space available on the examination paper.

Show clearly all the necessary steps, explanations and construction lines in your working.

Unless otherwise stated, diagrams are drawn to scale.

The use of non-programmable electronic calculators with statistical functions and mathematical instruments is allowed.

Candidates are allowed to use transparencies for drawing transformations.

This paper carries a total of 100 marks.

For Office Use Only									
Question No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Mark									

Question No	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Mark									

Total Mark	

1   Fill in the blank spaces to complete the following statements:

(a)   366 centimetres = _____ metres

(b)   The value of $\frac{3}{4}$ as a percentage is _____

(c)   The value of 4.5×10^{-2} as a decimal number is _____

(d)   _____ is the square number between 15 and 20

(e)   _____ is a prime number between 15 and 20

(f)   When rounded to the nearest cent, €2.112 is _____

(g)   When written as a fraction in its simplest form, 0.015 is _____

(Total: 7 marks)

2   A car is travelling at 45 miles per hour. The speed limit on the road is 60 km/h.
     Is the car travelling below the speed limit? You must show your working.
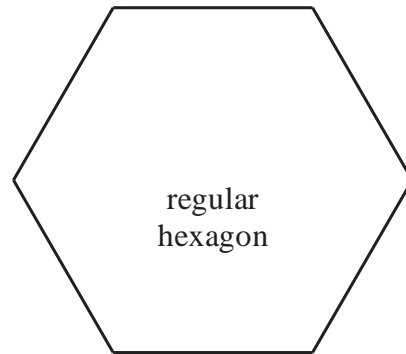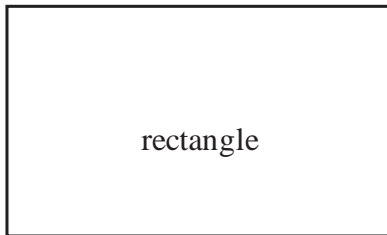   Use 1km = 0.62137 miles.

(Total: 3 marks)

3   In the diagram below, the lines AB, FC and ED are parallel.
     AFD, BCD and BFE are straight lines.

Diagram not drawn to scale
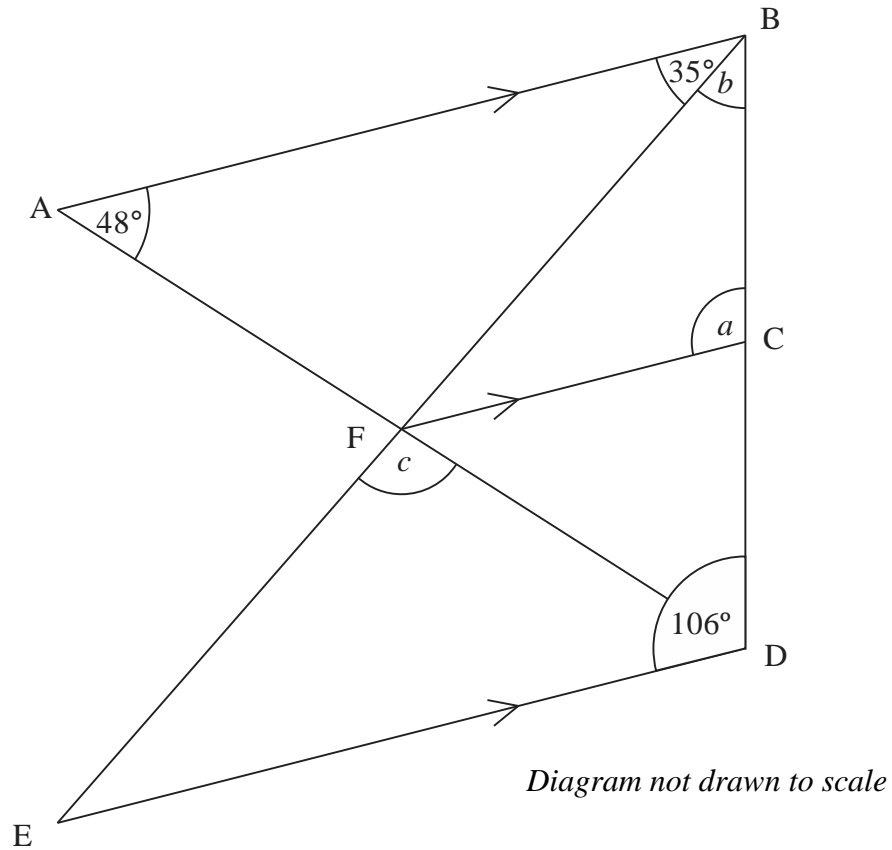
Use the information in the figure to work out the size of the angles marked *a, b* and *c.*
Give reasons for your answers.

(Total: 6 marks)

4   Mark all the lines of reflective symmetry for each shape.

(Total: 5 marks)

5   Katia sits for four tests. She gets promoted if her mean mark on the four tests is 75% or more.

Katia's results on the first three tests are 81%, 72% and 73%.

What is the least mark that Katia needs on her fourth test to be promoted?

(Total: 4 marks)

SEC23/2B.17s

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6   A survey recorded the number of people in each house of a particular street.
    This information was used to plot the bar chart shown below.
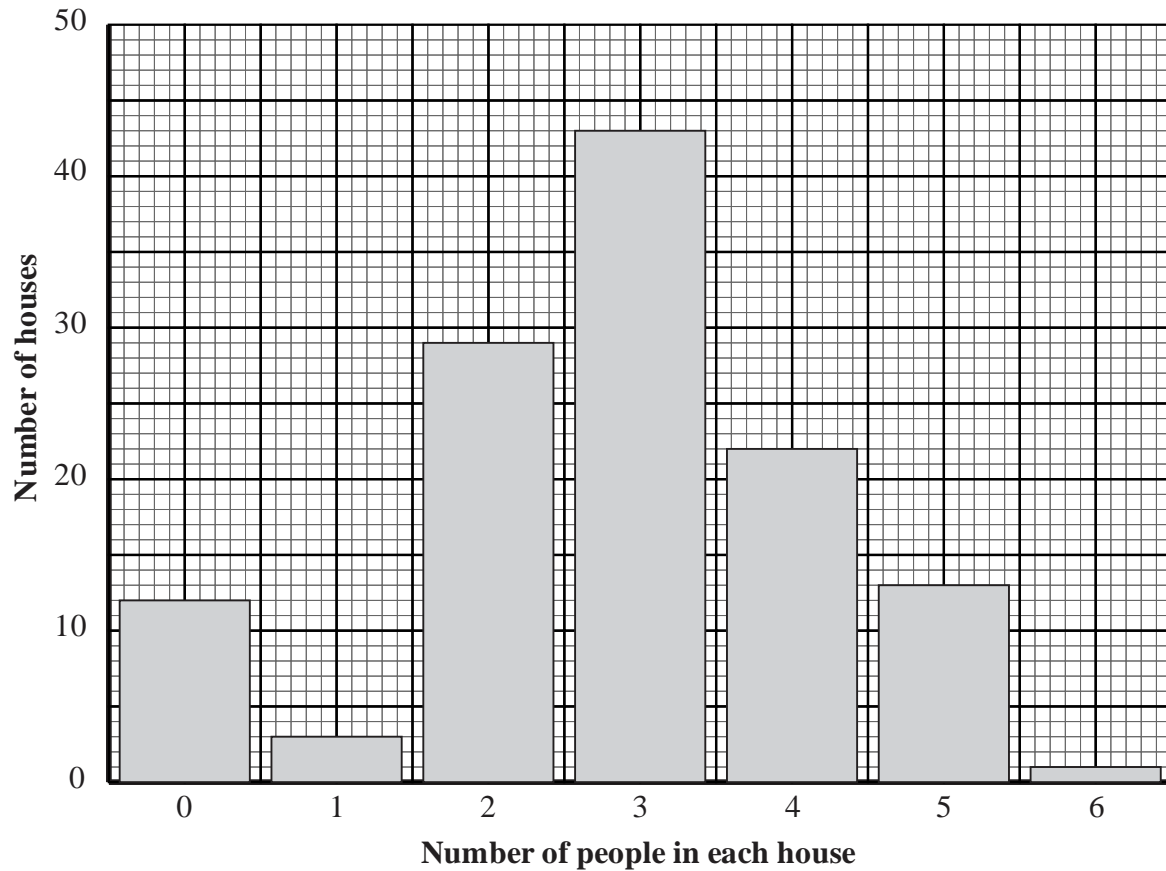
    (a)   Use the bar chart to find:

          (i)   the number of houses with no people living in them;

                                                                                              (1)
          (ii)   the number of houses with more than 2 people living in them;

                                                                                              (2)
          (iii) the total number of houses in the street.

                                                                                              (2)
    (b)   Work out the number of houses with no people living in them as a percentage of the total
          number of houses in the street.

                                                                                              (2)
                                                                                (Total: 7 marks)

Page 5 of 16

7   Diesel costs €1.14 per litre.
     A car that runs on diesel covers an average of 640 km with €40 of diesel.

     (a)   Calculate the amount of diesel in litres bought for €40. Give your answer correct to the
            nearest litre.

                                                                                                    (2)
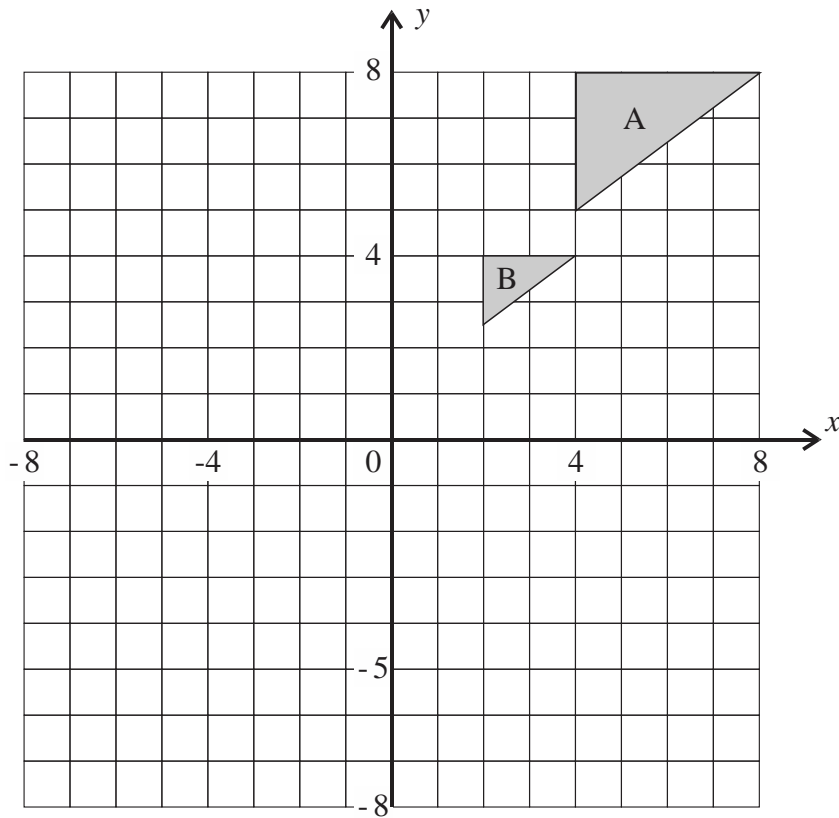
     (b)   Work out the average cost, in cents, for each km the car travels.

                                                                                                    (2)

     (c)   Find the average distance that the car travels with each litre of diesel.

                                                                                                    (2)
                                                                            (Total: 6 marks)

8

(a) Describe fully the transformation which maps Triangle A onto Triangle B.

(2)

(b) Translate Triangle A by $\begin{pmatrix} -9 \\ -2 \end{pmatrix}$ to obtain Triangle C.
Draw and label Triangle C.

(1)

(c) Rotate Triangle A by 180° about the origin to obtain Triangle D.
Draw and label Triangle D.

(1)

(Total: 4 marks)

9   (a)   A flight leaves Malta at 10:50 am and arrives in Istanbul at 2:10 pm local time.
            Istanbul is one hour ahead of Malta. Find the duration of this flight.

(2)

(b)   A flight from Istanbul arrives in Malta at 3:00 am. If the flight took the same flying time as
       the one in part (a), work out the local time at which it left Istanbul.

(3)

(Total: 5 marks)

10   A restaurant offers a 15% discount on its prices on Mondays.
      Last Monday, Arnold paid €38.25 for a meal.
      What price would he have paid for the same meal on a Tuesday?

(Total: 3 marks)

11 Use ruler and compasses only in this question.

    (a) Using line AB drawn below as base, construct triangle ABC with ∠CAB = 90° and BC = 12 cm. (3)

    (b) Using BC as base, construct triangle BCD so that CD = 9.6 cm and BD = 7.2 cm. (2)

    (c) Construct the perpendicular bisector of BC. (2)

    (d) Draw a circle with diameter BC. (1)

A   **B**
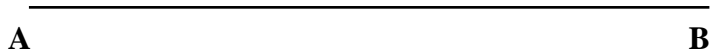
(Total: 8 marks)

12   Martha has a ream of paper. There are 500 sheets of paper in a ream.
      The ream has a thickness of $4\frac{3}{4}$ cm.
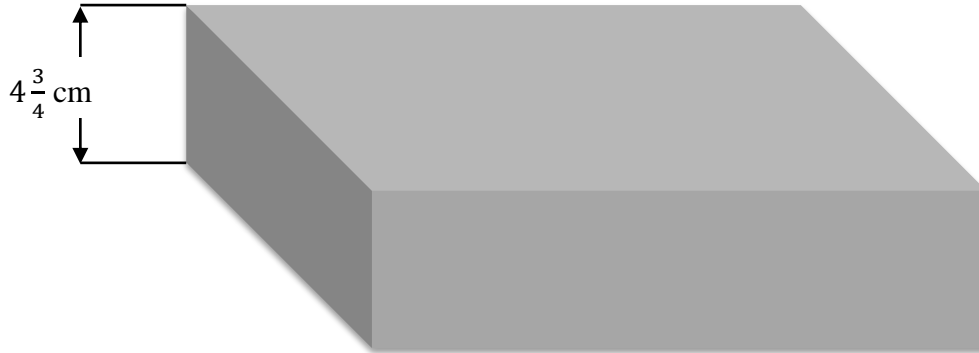
(a)   What is the thickness, in mm, of one of the sheets of paper?

(3)

(b)   Martha removes 300 sheets of paper from this ream. How thick will the remaining pile of pages be?

(2)
(Total: 5 marks)

13 The figure shows a scale drawing of the position of three places A, B and C on a map. The North direction is shown at each of these three places with an arrow.

Scale 1: 2000
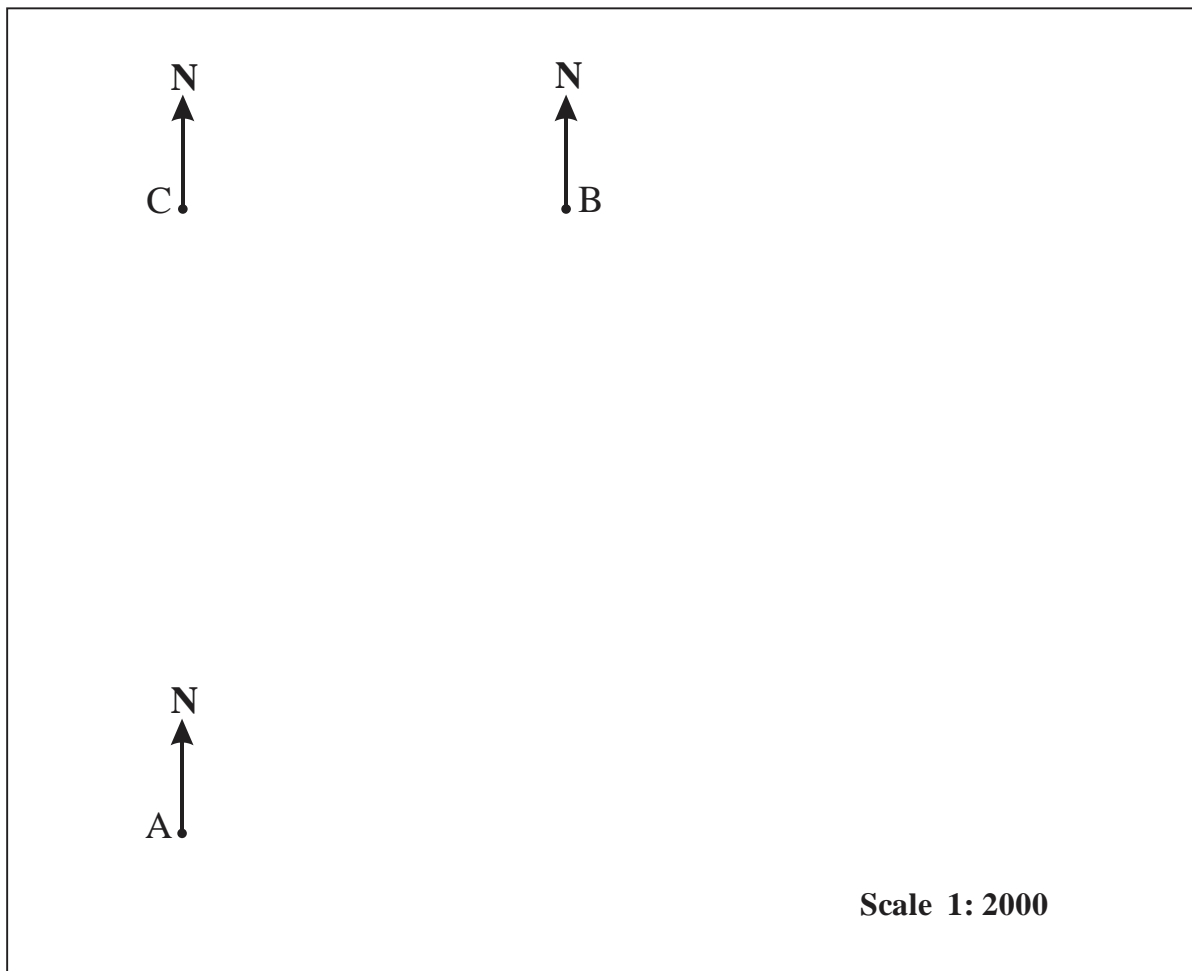
(a) What is the bearing of B from C?

(1)

(b) What is the actual distance BC in metres?

(2)

(c) What is the bearing of B from A?

(1)

(d) Use the figure to mark the position of a place P so that:
PA = PB = 160 m and
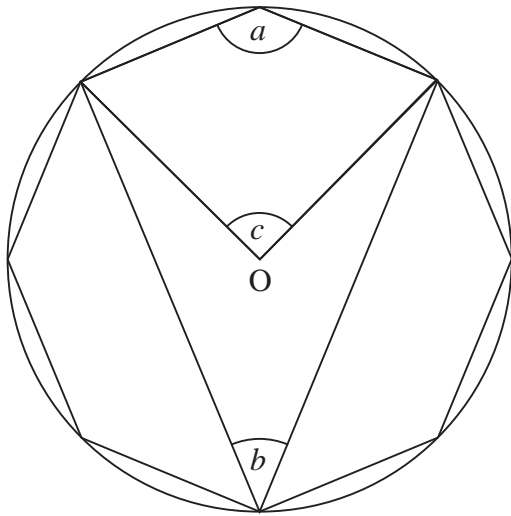P and C are on opposite sides of AB.

(3)

(Total: 7 marks)

14
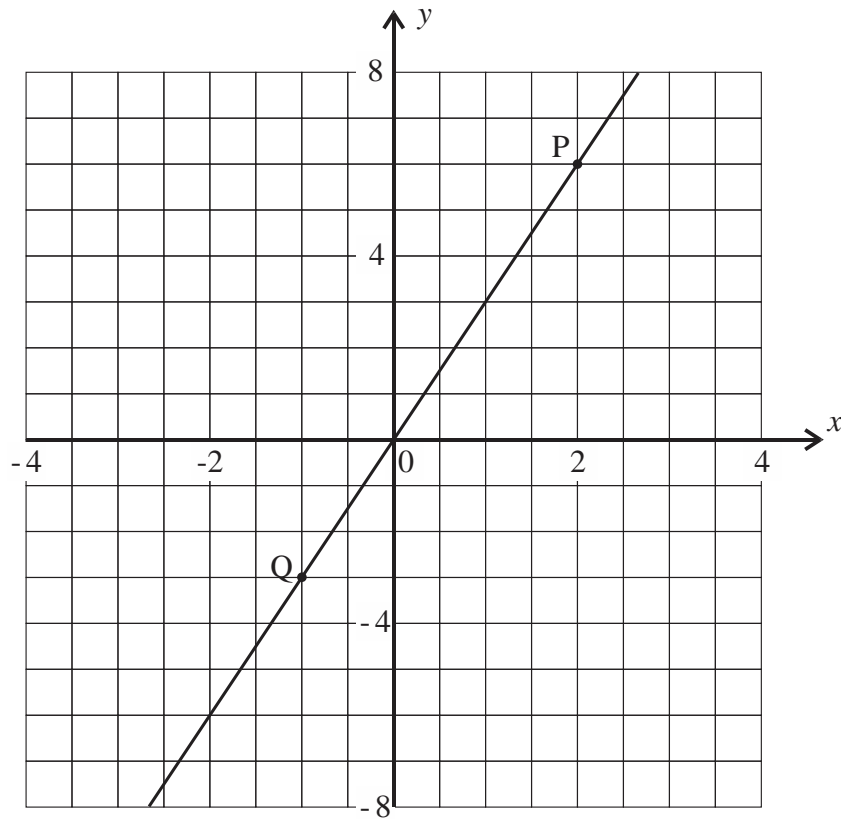
(a)   Write down the coordinates of the points P and Q.

(2)

(b)   Write down the equation of the line passing through the points P and Q.

(1)

(c)   On the same graph, draw the line with equation $y = -4$.

(1)

(Total: 4 marks)

15   The figure shows a circle with centre O. The vertices of a regular octagon lie on this circle.

(a)   Use a protractor to measure the angles marked *a*, *b* and *c*.

(2)

(b)   Use a method, other than measuring, to work out the size of:

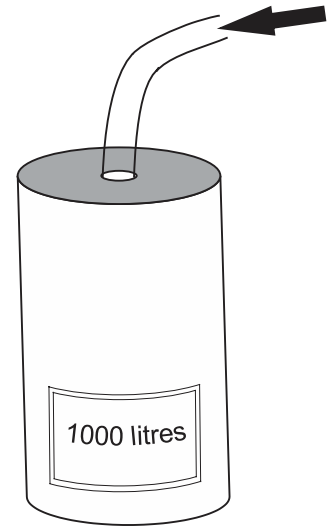(i)   angle *a*

(ii)   angle *b*

(iii)   angle *c*

(6)

(Total: 8 marks)

16   An empty tank has a capacity of 1000 litres.

It is filled from a water tap at a rate of 75 ml/s.

(a)   How many litres of water flow into the tank:

(i)   in one minute?

(2)

(ii)   in one hour?

(1)

(b)   How long does it take to fill the tank?
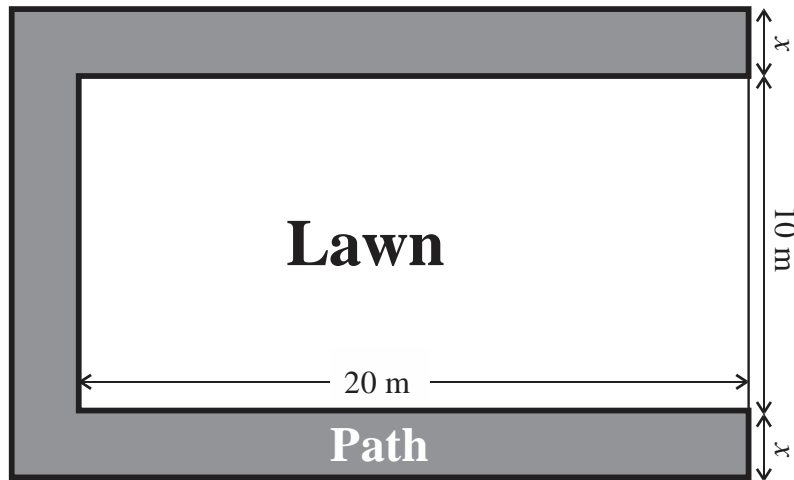Give your answer in hours and minutes, correct to the nearest minute.

(3)

(Total: 6 marks)

17   A rectangular lawn measuring 20 metres by 10 metres is surrounded on three sides by a path of width x metres as shown in the diagram.

The **total** perimeter of the path is 112 m.
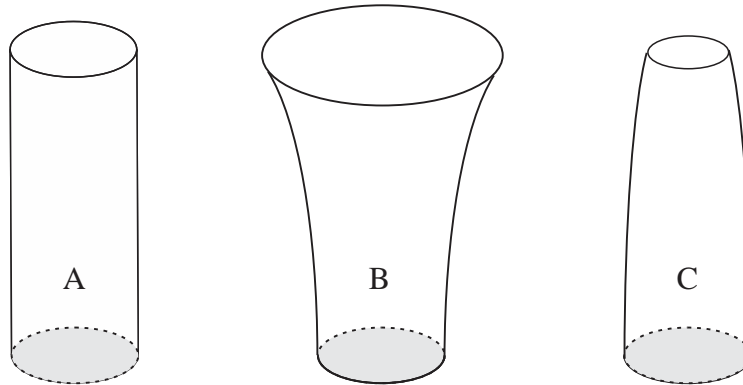
(a)   Find the width x of the path.

(4)

(b)   Find the area of the path.

(3)

(Total: 7 marks)

18 (a) The three containers shown in the figure all have a circular base of radius 5 cm.

A litre of water is poured into each container.

(i) Which container has the highest level of water?

(1)

(ii) Which container is in the shape of a cylinder?

(1)

(iii) What is the height of water in container A?

(3)

(Total: 5 marks)