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

SECONDARY EDUCATION CERTIFICATE LEVEL

SEPTEMBER 2014 SESSION

|			
SUBJECT:	Mathematics	**PAPER:**	I – Section A (Non-Calculator Section)
DATE:	4th September 2014	**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 How many lines of symmetry does this shape have?
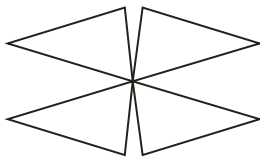
Ans _____

2 Write two numbers whose **Least Common Multiple** is 20.
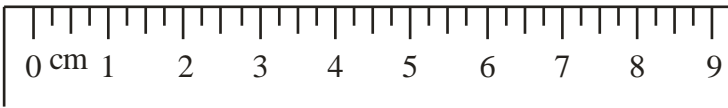
Ans _____
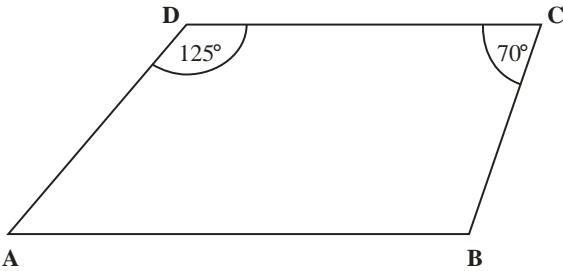
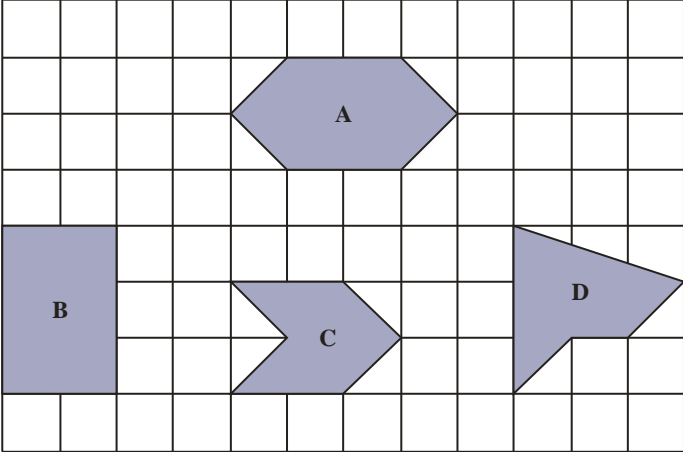**3** Write 0.36 as a **fraction** in its lowest form.

Ans _____
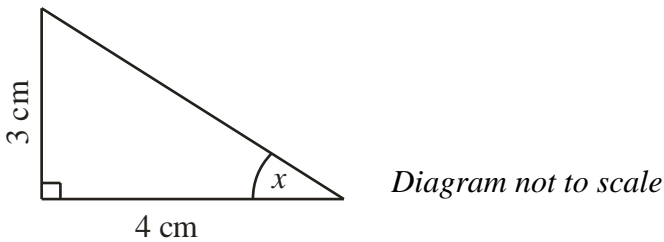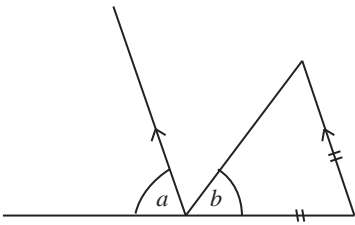
4 Evaluate $\sqrt{6.172 + 2.828}$

Ans _____

5 One million euro is to be shared equally between 8 charity institutions. How much will each institution get?

Ans _____

QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK	SPACE FOR ROUGH WORK (IF NECESSARY)
6 Determine the value of $\sqrt{\left(\dfrac{100}{9}\right)}$. Ans _____	
7 Work out the value of $\dfrac{32\times25}{700}$, giving your answer as a fraction in its lowest terms. Ans _____	
8 How long is line A in millimetres? Line A ━━━━━━━━━ 0 cm 1 2 3 4 5 6 7 8 9 Ans _____	
9 The diagram shows a trapezium ABCD with side AB parallel to DC. The diagram is not drawn to scale. D 125° C 70° A B Use the information given in the figure to find the size of ∠DAB. Ans _____	
10 The sum of €1500 is to be shared between Peter and Simon in the ratio 3:2. If Peter gets the larger share, how much does he get? Ans _____	

QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK	SPACE FOR ROUGH WORK (IF NECESSARY)

11 Work out the value of: $3^0 + \left(\frac{1}{3}\right)^{-1} + 3^2$

Ans _____

12

Name the shape which has the same area as shape A.

Ans _____

13 Write the number 324 as a product of prime factors.

Ans _____

14 If $X = a^2 + b^2$, which one of the following statements is **NOT** true?

    A. $X - a^2 = b^2$ **B.** $a^2 = X - b^2$

    C. $\sqrt{X} = a + b$ **D.** $a = \sqrt{X - b^2}$

Ans _____

15 Anna kept a record of her room temperature taken at noon over 5 days as follows:

24°C, 28°C, 24°C, 26°C, 23°C

Calculate the mean temperature over the five days.

Ans _____

QUESTIONS AND ANSWERS ALL QUESTIONS CARRY ONE MARK	SPACE FOR ROUGH WORK (IF NECESSARY)

16

3 cm

4 cm

x

Diagram not to scale

Use the measurements given in the figure to find the value of sin x.

Ans _____

---

17   14 sandwiches and 3 drinks cost €33.75.
6 sandwiches and 17 drinks cost €26.25.

What is the **total** cost of one sandwich and one drink?

Ans _____

---

18   Which one of the following statements is true?

A. $a + b = 180°$
B. $a + b = 90°$
C. $a + 2b = 180°$
D. $2a + b = 180°$

a b

Ans _____

---

19   Work out:

$$(7.52 \times 10^2) + (6 \times 10^1)$$

Give your answer in standard form.

Ans _____

---

20   For its summer sale, a clothes shop offers a reduction on the marked prices by 20%. What is the sale price of a suit with marked price €155?

Ans _____

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

SECONDARY EDUCATION CERTIFICATE LEVEL

SEPTEMBER 2014 SESSION

SUBJECT:	**Mathematics**
PAPER NUMBER:	I – Section B (Calculator Section)
DATE:	4th September 2014
TIME:	1hr and 40 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.

For Office Use Only												
Mental	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**Total**

1   The table shows the ages of men and women on a bus.

Age in years	0 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	> 79
Males	4	1	2	0	1	4	2	0
Females	5	2	7	2	4	5	2	1

(i)   How many persons on the bus are 19 or younger?

1 mark

(ii)   How many persons on the bus are sixty years of age or more?

1 mark

(iii)   How many persons are there on the bus altogether?

2 marks

(iv)   A person is chosen at random from the bus. Is the person more likely to be a male or a female? Explain your reasoning.

2 marks

2   A winemaker stores his wine in wooden barrels each holding 500 litres.

(i)   What is the capacity of each barrel in gallons if 1 gallon is equal to 4.546 litres? Give your answer to the nearest gallon.
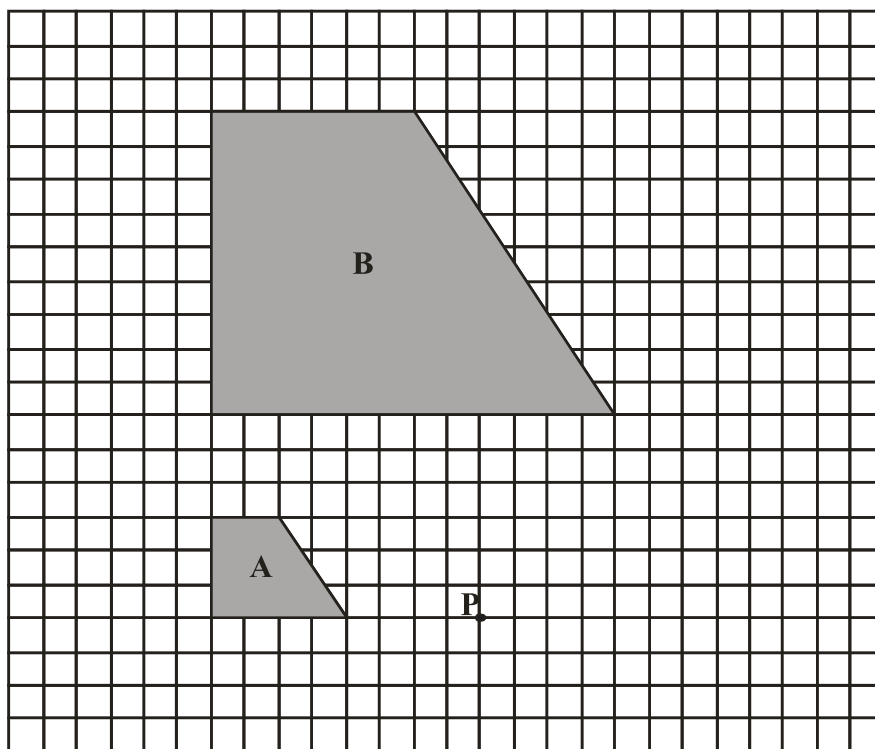
2 marks

(ii)   The wine in a barrel will be used to fill 80 bottles each holding ¾ litre and a number of glass containers each holding 5 litres. How many 5 litre containers are needed to empty the barrel completely?
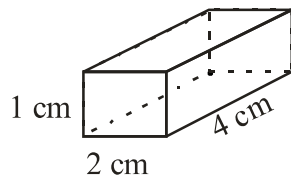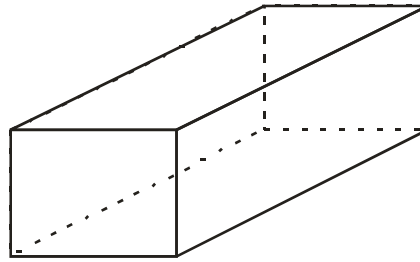
3 marks

3

(i) In the diagram above, Shape **A** has been enlarged to obtain shape **B**. Mark the centre of enlargement as point **O**.

1 mark

(ii) What is the scale factor of the enlargement which maps Shape **A** onto Shape **B**?

1 mark

(iii) What is the scale factor and the centre of the enlargement which maps Shape **B** onto Shape **A**?

2 marks

(iv) On the grid above, draw the rotation of shape A by 180° about point P. Label the image shape as **C.**

2 marks

4 The diagram below shows a small Box **S** and a larger Box **L**. Each edge of Box **L** is **three times** the size of a corresponding edge in Box **S**.

Box S   **Box L**

(i) Box **S** measures 2cm by 4 cm by 1 cm. What are the measurements of Box **L**?

3 marks

(ii) Calculate the volume of Box **S**.

1 mark

(iii) Maria says "The volume of Box **L** is three times the volume of Box **S**". Is Maria right or wrong? Explain why.

3 marks

5   **(a)**   A tennis tube, in the shape of a plastic cylinder, is designed to hold 4 tennis balls each of radius 3.4 cm. The tennis balls fit exactly inside the tube so that the balls touch all the faces of the container.

Work out:
(i)   the height of the tennis tube.

1 mark

(ii)   the area of the curved surface of the tennis tube. Give your answer to the nearest cm^2.
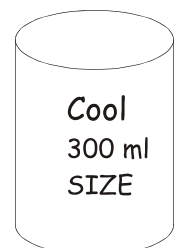
2 marks

(iii)   the total area of plastic used to make a closed tennis tube, ignoring any overlapping parts.
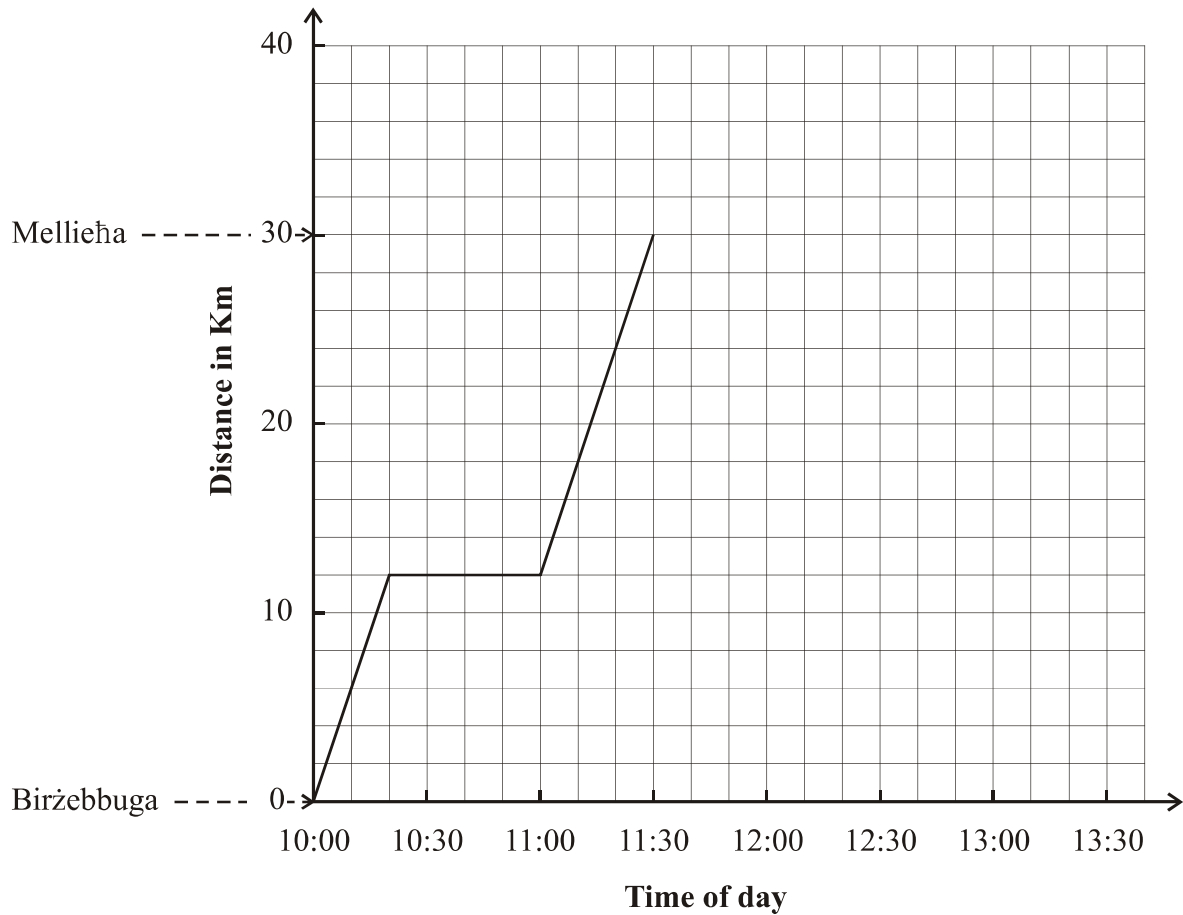
3 marks

(b)   A drinks company is designing aluminum tins for a new drink.
The drink will be sold in cylindrical tins of radius 2.8 cm.
The volume of each tin is 300 cm^3.
What is the height of the tin?

4 marks

6

Josef drove from his house in Birżebbuġa to Mellieħa and back to Birżebbuġa.
On his way to Mellieħa, he stopped at Msida.
The graph shows the first part of his journey from Birżebbuġa to Mellieħa.

(i) What is the distance from Josef's house to Mellieħa?

1 mark

(ii) How long did he stop at Msida?

1 mark

(iii) Calculate his average speed, in km/h, on his way from **Birżebbuġa** to **Msida**?

3 marks

(iv) After stopping for 45 minutes at Mellieħa, Josef drove back directly to Birżebbuġa and arrived home at 12:45. Complete the above graph to show the return part of his journey.

2 marks

DO NOT WRITE ABOVE THIS LINE

(v) During which part of his journey was Joseph driving fastest? Show your working.

3 marks

7 The world population is 7.25 billion (7 250 000 000) people. The table below shows the population of the seven countries in the world having the highest populations. The countries are given in alphabetical order.

Country	Population
Brazil	2.02×10^8
China	1.39×10^9
India	1.27×10^9
Indonesia	2.53×10^8
Nigeria	1.79×10^8
Pakistan	1.85×10^8
U.S.A.	3.23×10^8

(i) Which countries have a population of more than a billion people?

2 marks

(ii) Which country shown in the table has the least population?

1 mark

(iii) Which country has around four fifths the population of Indonesia?

1 mark

(iv) What percentage of the world's population lives in India?

2 marks

8   ABC is a triangle with line DE drawn parallel to BC. AD = 5 cm, BD = 14 cm and DE = 10 cm.
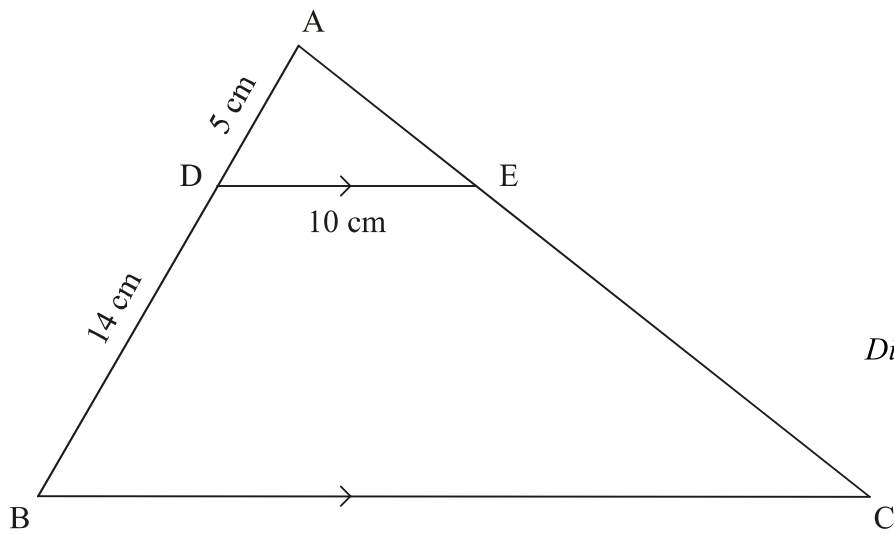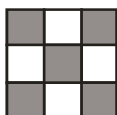

Diagram not drawn to scale

(i)   Prove that triangles ADE and ABC are similar.

3 marks

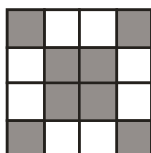**(ii)**   Find the length of BC.

3 marks

9 The shapes below follow a pattern.
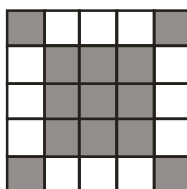
| Shape 1 | Shape 2 | Shape 3 | Shape 4 |
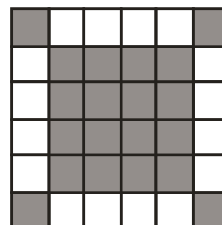
Use this pattern to complete the table below.

Shape Number	1	2		5	10	n
Number of White Tiles	4	8				
Number of Grey Tiles	5	8				
Total Number of Tiles	9	16				

9 marks

10 **(a)** A dvd has a playing time of 2 hours 45 minutes. Maria wants to make sure she has time to watch all the dvd before she goes out at 2 pm. What is the latest time to start her dvd?

2 marks

(b) On Friday 20th July Sandro flew from Malta to Spain. He returned to Malta after two weeks on a Friday. What was the date when he came back?

2 marks

**(c)** Mona leaves Malta on Monday at 22:35 and arrives in St Petersburg at 04:50 on Tuesday local time. On her return flight, she leaves St Petersburg at 05:35 local time and arrives in Malta the same day at 07:50 local time. Mona's departure and return flights take the same time. By how many hours is St Petersburg ahead of Malta? Explain your reasoning.

3 marks

11 A rectangle ABCD can be drawn as in the diagram so that its vertices lie on the circumference of a circle **centre O** and radius **5 cm**.

(i) Explain why the size of $\angle$ DOB is 180° for all such rectangles.
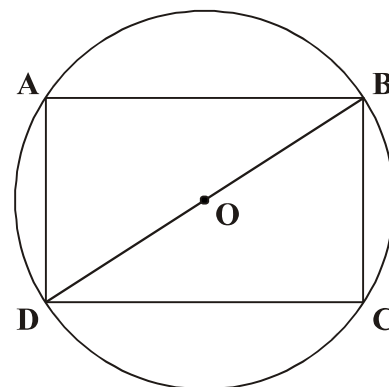
1 mark

(ii) What is the length of BD?

1 mark

(iii) Work out the length of AD when AB = 8 cm.

2 marks

(iv) If AB is x cm long, write an expression for the length of AD in terms of x.

2 marks

(v) What is the length of AB when ABCD is a square?

2 marks

Page 12 of 12

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MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

UNIVERSITY OF MALTA, MSIDA

SECONDARY EDUCATION CERTIFICATE LEVEL

SEPTEMBER 2014 SESSION

SUBJECT:	**Mathematics**
PAPER NUMBER:	IIB
DATE:	4th September 2014
TIME:	4:00 p.m. to 6:00 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.

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Question No	1	2	3	4	5	6	7	8	9	10
Mark										

Question No	11	12	13	14	15	16	17	18	19	20
Mark										

Total Mark	

1   Put a ✓ against the **ONE** correct response to the following questions:

a.   Find the least common multiple of 6 and 8.

☐ 2   ☐ 48   ☐ 24   ☐ 68

b.   Which number is **not** equal to half a million?

☐ 5×10^5 ☐ 500 000   ☐ 5×10^7 ☐ ¼ of two million

c.   Which of the following is a prime number?

☐ 39   ☐ 770   ☐ 17   ☐ 242

d.   Which of the following is a square number?

☐ 5400   ☐ 81   ☐ 111   ☐ 90

e.   Which is the smallest number?

☐ − 11   ☐ − 10.3   ☐ − 5   ☐ − 1.99
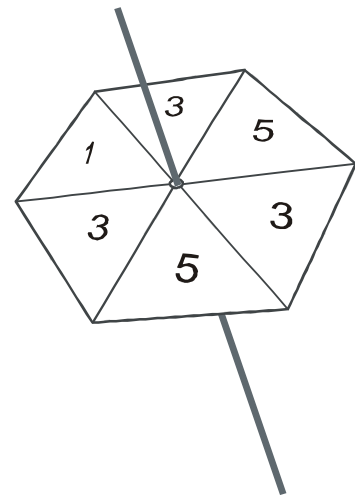
5 marks

2   This spinner has six sides.
It has equal chances of landing on each of its sides.

(i)   What is the probability it lands on 5?

(ii)   What is the probability it lands on an odd number?

(iii)   What is the probability it lands on an even number?

3 marks

3   A boat sails from P. It travels 15 km due East and then a further 27 km due South to arrive at Q.

   (i)   Draw a rough sketch of the path travelled.

1 mark

   (ii)   Calculate the distance PQ.

2 marks

   (iii) On which bearing must the boat sail so that it goes back directly to its starting point in a straight line?

3 marks

4   Simplify where possible the following algebraic expressions.
Write your answers in the spaces provided.
Mark an X in the adjacent space if you think that the expression cannot be simplified.

   (i) $2a + b - b$ _____

   (ii) $(3a + b) - b$ _____

   (iii) $5a + 11b$ _____

   (iv) $(a + 1) - (a - 1)$ _____

   (v) $(a + b^2) - (a - b)$ _____

5 marks

5   A car rental company charges a basic amount of €124.60 for a 7–day car rental of an economy car.

Moreover, the company makes the following **Additional Charges**.

Description	Additional Charges
Car insurance	€14.50 per day
Additional driver	€6.50 per day
Airport fee	€19 (charged once)
Child seat	€45 (charged once)
VAT	Tax is calculated at 18% of the total expenses

(i)   Nadia decides to rent an economy car for 7 days taking all the options listed in the table above. Calculate the total cost **without** VAT.

3 marks

(ii)   Work out Nadia's total cost for renting the car **including VAT**.

3 marks

6   A confectioner makes Gift Packs to contain **one chocolate bar** and **one cake** from the list.

CHOCOLATE BARS   CAKES
Dark Chocolate **D**   Vanilla **V**
Hazelnut Chocolate **H**   Lemon **L**
Mint Chocolate **M**   Orange **O**

(i)   One possibility is that a pack contains a Dark Chocolate Bar and a Vanilla Cake, represented by **DV** below. Complete the set of possible outcomes in the space below.

DV, _____

3 marks

(ii)   All possibilities are equally likely. A pack is chosen at random.
What is the probability that:

a.   it contains a Dark Chocolate bar and an Orange Cake?

1 mark

b.   it contains a Dark Chocolate bar?

1 mark

(iii)   Ninety packs are ordered. How many of the gift packs would you expect to contain a Dark Chocolate bar?

1 mark

7   Paul is now 16 years old.
In five years' time, his mother will be exactly twice as old as Paul.
How old is Paul's mother now?

3 marks

8 Five gardeners take 9 hours to plant flowers in a garden.

  (i) How many gardeners are needed to plant the same garden in 3 hours?

2 marks

  (ii) How many hours does it take 6 gardeners to plant the same garden?

2 marks

9 Of the people attending a concert, 40% are males.

  (i) What percentage are females?

1 mark

  (ii) There are 465 people at the concert. How many of them are males?

1 mark

  (iii) What is the ratio of males to females for the people attending the concert? Write this ratio in its simplest form.

2 marks

10 Complete the logo program which draws this shape.

FD 20

_____

FD 20

_____

FD 30

_____

FD 20

RT 90
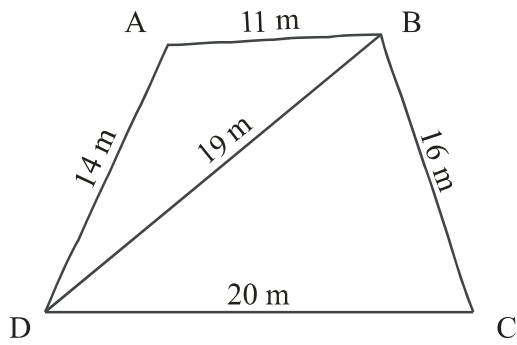
_____
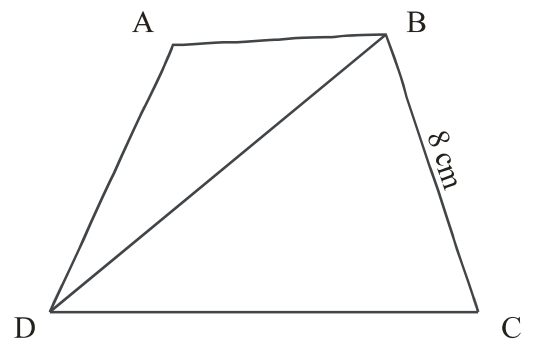
RT 90

_____
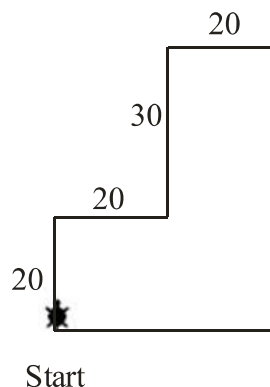
5 marks

11

Fig. 1

Fig. 2

Fig. 1 shows the measurements of a field.

(i) In Fig 2, write the lengths needed to make a scale diagram of this field so that 2 m on the ground is represented by 1 cm on the scale diagram. One side has already been marked for you.

2 marks

(ii) Use ruler and compasses to draw a scale diagram of the field taking your measurements from Fig. 2.

4 marks

(iii) Use your scale diagram to determine the actual length of the diagonal AC of the field.

2 marks

12 The three sides of a triangle are 9 cm, 40 cm and 41 cm long.
Without drawing the triangle show that it is right angled.

3 marks

13 In a survey, a number of youths were asked about their favourite type of movie. The results are shown in the table below.
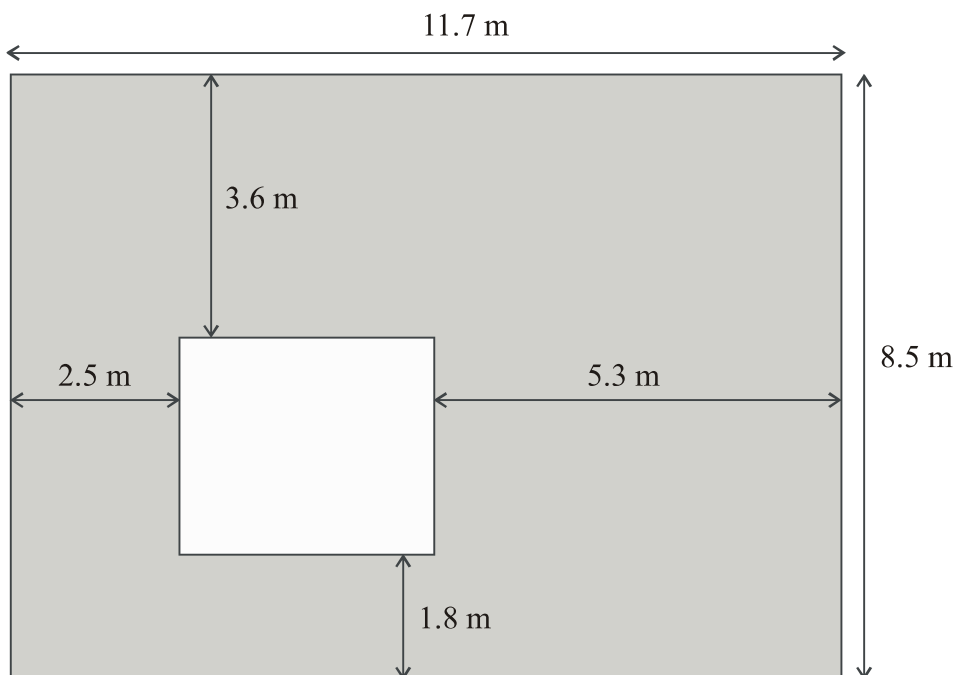
Favourite Type of Movie	Frequency
Action	68
Comedy	47
Romance	36
Sci-fi	29

(i) How many youths took part in the survey?

1 mark

(ii) Use the above results to complete and label the Pie Chart below.
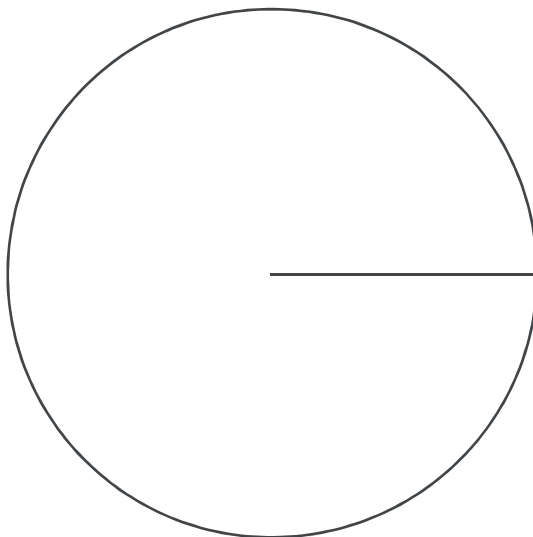
Favourite Movies

4 marks

14

11.7 m

3.6 m

2.5 m   5.3 m   8.5 m

1.8 m

(i) Find the area of the outer rectangle.

1 mark

(ii) Using the measurements in the figure, find the length and width of the white inner rectangle.

3 marks

15 Put the numbers in the lists below in order starting from the smallest number.
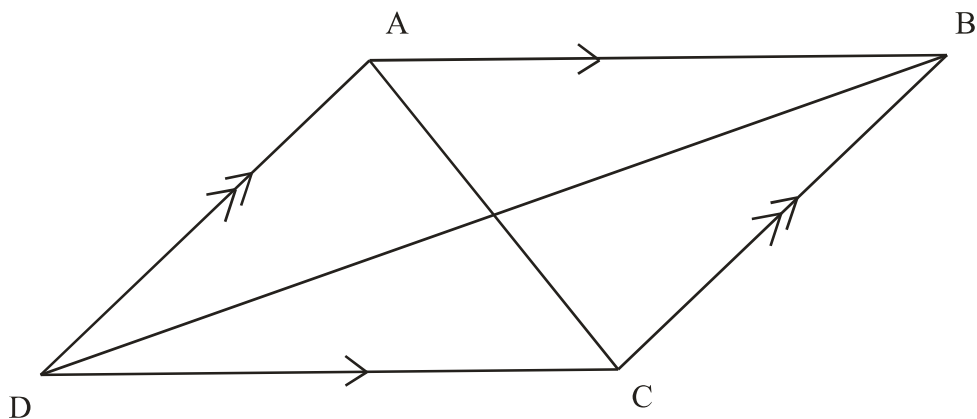
(i) 0.99, 1.07, 1.3, 1.09, 1.0099

2 marks

(ii) 44, − 75, −105, − 75.9, 60

2 marks

16 The opposite sides of the quadrilateral in the figure below are parallel.

(i) Put a ✓ against the appropriate word to complete the following sentence.

> The quadrilateral ABCD is a
>
> ☐ rectangle ☐ trapezium ☐ rhombus ☐ parallelogram

1 mark

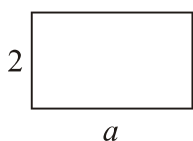**(ii)** What is the order of rotational symmetry of ABCD?

1 mark

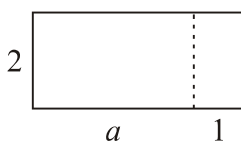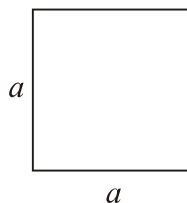**(iii)** Does ABCD have reflective symmetry?

1 mark

(iv) Prove that ΔBAD is congruent to ΔDCB.

3 marks

17 Write an expression for the areas of the following rectangles in the spaces provided.
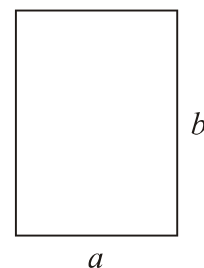
4 marks

18   The temperature in degrees Fahrenheit, F, is converted to degrees Celsius, C, using the formula

$$C = \frac{5(F - 32)}{9}$$

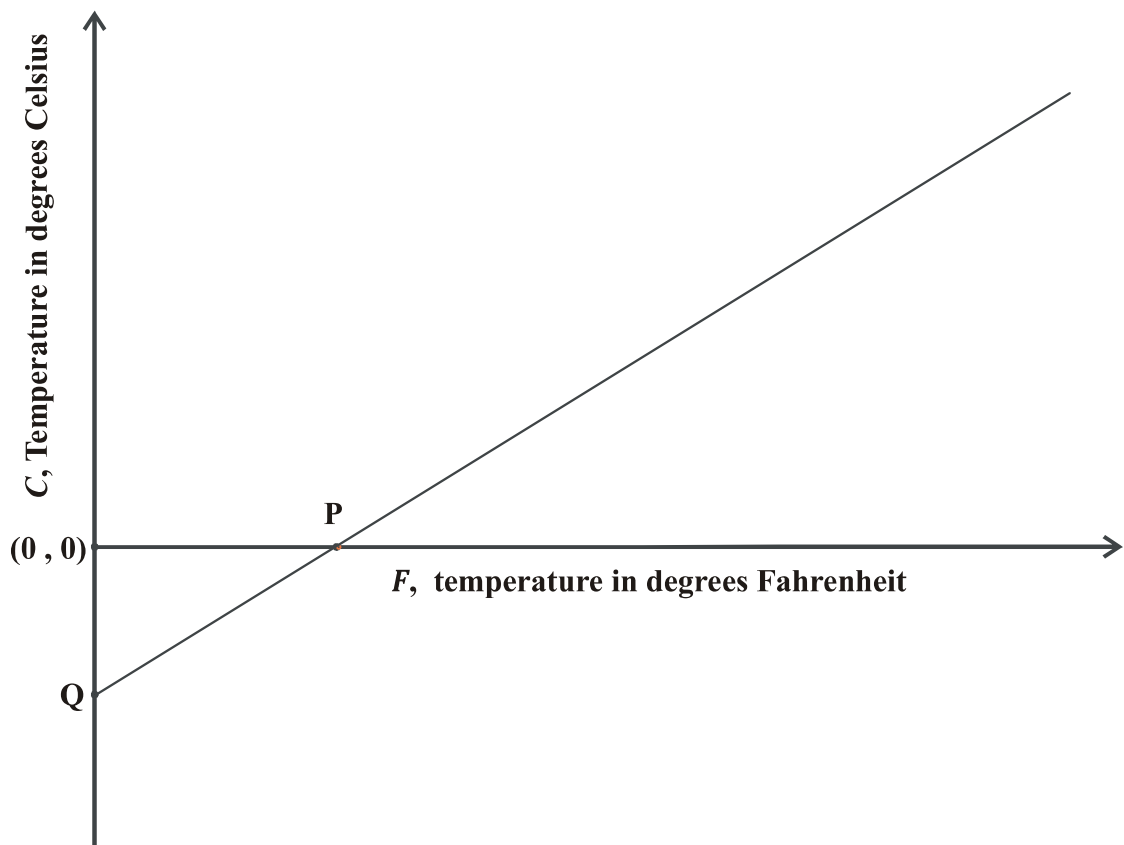**(i)**   Find the value of C when $F = 356$.

1 mark

(ii)   Find the value of F when $C = 40$.

3 marks

(iii)   The graph below displays how C and F vary together.

Work out the coordinates of the points P and Q on the graph.

4 marks

19 A list of conversions between the Euro (EUR), the American Dollar (USD) and the Swiss Franc (CHF) is given below.

1 USD = 0.7350 EUR

1 CHF = 1.1203 USD

Use the above information to:

(i) Find the value in **Euro** of 3550 USD.

<div align="right">

1 mark
</div>

(ii) Find the value in **American Dollars** of 400 EUR.

<div align="right">

1 mark
</div>

(iii) Find the value in **Euro** of 1000 CHF.

<div align="right">

2 marks
</div>

(iv) Find the value in **Swiss Francs** of 1 EUR.

<div align="right">

2 marks
</div>

20 Sean takes 2 hours to paint a room. Frank takes double the time to paint the same room.
   (i) What fraction of the room does Sean paint in an hour?

<div align="right">

1 mark
</div>

   (ii) What fraction of the room does Frank paint in an hour?

<div align="right">

1 mark
</div>

   (iii) How long does it take Sean and Frank working together to paint this room?

<div align="right">

3 marks
</div>