Index Number: _____ SEC23/1a.22s

L-Università ta' Malta

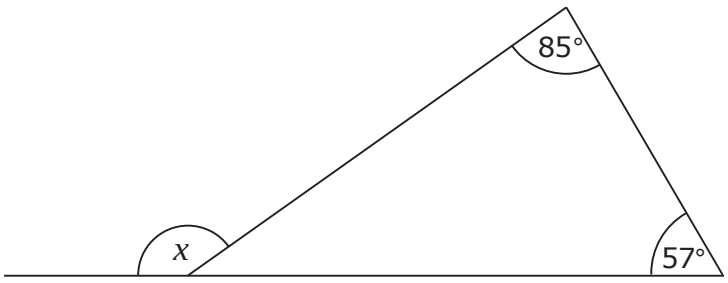
MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

SECONDARY EDUCATION CERTIFICATE LEVEL
2022 SUPPLEMENTARY SESSION

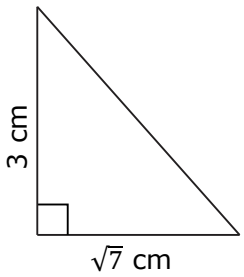
SUBJECT: **Mathematics** PAPER: I – Section A (Non-Calculator Section)
DATE: 27th August 2022 TIME: 20 minutes

Attempt **ALL** questions.

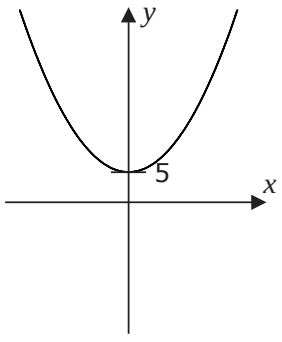
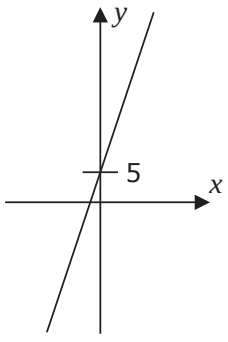
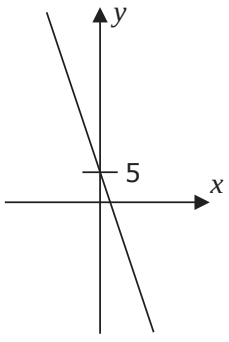
Write your answers in the space available on the examination paper.
The use of calculators and protractors is **not** allowed.
It is **not** necessary to show your working.
This paper carries a total of 20 marks.

QUESTIONS AND ANSWERS **ALL QUESTIONS CARRY ONE MARK**	**SPACE FOR ROUGH WORK (IF NECESSARY)**
1 Write the next **TWO** terms of the sequence: 81, 74, 67, 60, _____, _____.	
2 Work out the value of the expression $mn + 2t^2$ when $m = 20,\ n = 5$ and $t = 3$. **Ans** _____	
3 Write 0.28 as a fraction in its lowest terms. **Ans** _____	
4 Determine the size of angle x.  **Ans** _____	

QUESTIONS AND ANSWERS **ALL QUESTIONS CARRY ONE MARK**	**SPACE FOR ROUGH WORK (IF NECESSARY)**
5 The temperature in Moscow was recorded to be -5°C. On the same day, the temperature in Valletta was recorded to be 12°C. What is the difference in temperature between the two capital cities? **Ans** _____	
6 The area of a circle is 100π cm^2. What is the radius of the circle? **Ans** _____	
7 Martha was born on 1st December 1977. She is now _____ years old.	
8 Find the value of: $2^3 + 2^0 + 2^{-1}$ **Ans** _____	
9 Twelve poles are erected vertically along a straight road. The distance between each pole is 2.5 m. What is the distance between the first and last pole? **Ans** _____	
10 Work out: $5 + 3^2 \times 9$ **Ans** _____	
11 Write down 180 as a product of prime factors. **Ans** _____	

QUESTIONS AND ANSWERS **ALL QUESTIONS CARRY ONE MARK**	**SPACE FOR ROUGH WORK (IF NECESSARY)**
12 A rectangle and a square have an equal perimeter. If the rectangle is 10 cm long and 6 cm wide, what is the length of each side of the square? **Ans** _____	
13 A map is drawn with a scale of 1 : 20,000. If the distance between two shops is 600 m, what length in cm represents this distance on the map? **Ans** _____	
14 Using 39 × 57 = 2223, find the value of: 13 × 57 **Ans** _____	
15 Work out the length of the hypothenuse of this triangle.  **Ans** _____	
16 Find the value of k such that: $2^k \times 2^k = 64$ **Ans** _____	

DO NOT WRITE ABOVE THIS LINE

QUESTIONS AND ANSWERS **ALL QUESTIONS CARRY ONE MARK**	**SPACE FOR ROUGH WORK (IF NECESSARY)**
17 Which **ONE** of the following statements is correct? (a) 7 is a multiple of 28 (b) 15 is a factor of 3 (c) 37 is a prime number (d) 27 is a square number **Ans** _____	
18 Write down the coordinates of any point which lies on the line $y + 2x = 3$. **Ans** _____	
19 Make x the subject of the formula: $\frac{3}{x} = \frac{y}{5}$ **Ans** _____	
20 Which graph could represent $y = 5 - 3x$?  Figure A  Figure B  Figure C **Ans** _____	

Index Number:_____ SEC23/1b.22s

L-Università ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

SECONDARY EDUCATION CERTIFICATE LEVEL
2022 SUPPLEMENTARY SESSION

SUBJECT:	**Mathematics**
PAPER NUMBER:	I – Section B (Calculator Section)
DATE:	27th August 2022
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 of mathematical instruments is allowed.

Candidates are allowed to use transparencies for drawing transformations.

This paper carries a total of 80 marks.

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

1 (a) Write down €1936 correct to the nearest €10.

(1)

(b) Write the fraction $\frac{28}{49}$ in its simplest form.

(1)

(c) Write down a fraction which is greater than $\frac{2}{3}$ and smaller than 1.

(1)

(d) Write down a prime number which lies between 20 and 30.

(1)

(e) Work out the value of m when $5^6 \times 5^m = 5^{18}$.

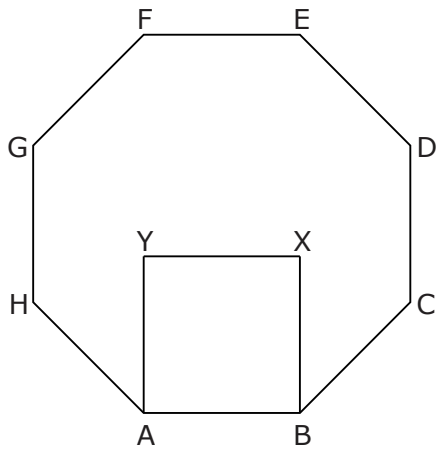
(1)

(f) Simplify the expression $\frac{20r^8}{6r^2}$ as much as possible.

(1)

(Total: 6 marks)

2 ABXY is a regular quadrilateral.
ABCDEFGH is a regular octagon.
Determine, by using appropriate working (and not just measuring) the size of:



(a) **each** interior angle of the octagon;

(3)

(b) ∠HAY.

(1)

(Total: 4 marks)

3 (a) Sara buys a TV set. She pays an initial deposit of €70. Then she pays a monthly payment of €30 for 24 months.
What is the total amount Sara spends on her TV set?

(3)

(b) Karl buys the same TV by cash and spends €665.
How much more does Sara spend?

(1)

(c) Mandy buys the same TV by cash. She is given 15% discount on the cash price of €665. How much does Mandy spend?

(3)

(Total: 7 marks)

4 The table shows the amount of wheat produced last year in the top ten wheat producing countries.

Country	Wheat produced in metric tonnes in 2021
Australia	3.30×10^7
Canada	3.52×10^7
China	1.34×10^8
France	3.05×10^7
Germany	2.21×10^7
India	1.08×10^8
Pakistan	2.52×10^7
Russia	8.54×10^7
Ukraine	2.55×10^7
USA	4.97×10^7

(a) Which country produced the largest amount of wheat?

(1)

(b) Which country produced the second largest amount of wheat?

(1)

(c) Which of these ten countries produced the smallest amount of wheat?

(1)

(d) Write the following as ordinary numbers in words:

(i) 3.30×10^7 (1)

(ii) 1.08×10^8 (1)

(e) How much more wheat did Ukraine produce than Pakistan?
Give your answer in standard form.

(2)

(Total: 7 marks)

5 (a) Construct triangle ABC so that BC is the line given below, AB = 10 cm and angle ABC = 60°. In your construction, use compasses and ruler only.

B C

(4)

(b) Draw the locus of points inside the triangle which are 7 cm away from B.

(2)

(c) Draw the locus of points which are equidistant from points A and C.

(2)

(d) The two loci described in parts (b) and (c) meet at point D.
Mark point D and measure the distance CD.

(1)

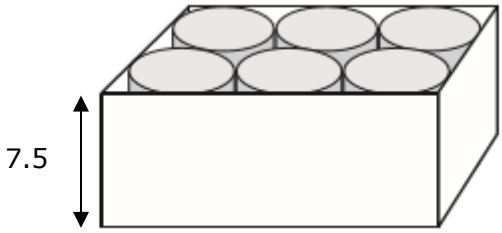
(Total: 9 marks)

6 A can is in the shape of a cylinder of radius 2 cm and height 7.5 cm.

(a) Calculate the volume of **ONE** can.

(2)

Six of these cans fit exactly into a box of height 7.5 cm as shown.



(b) Work out the length and width of the box.

Length =_____cm Width = _____cm (2)

(c) Calculate the volume of the box.

(2)

(d) Calculate the volume of the empty space in the box.

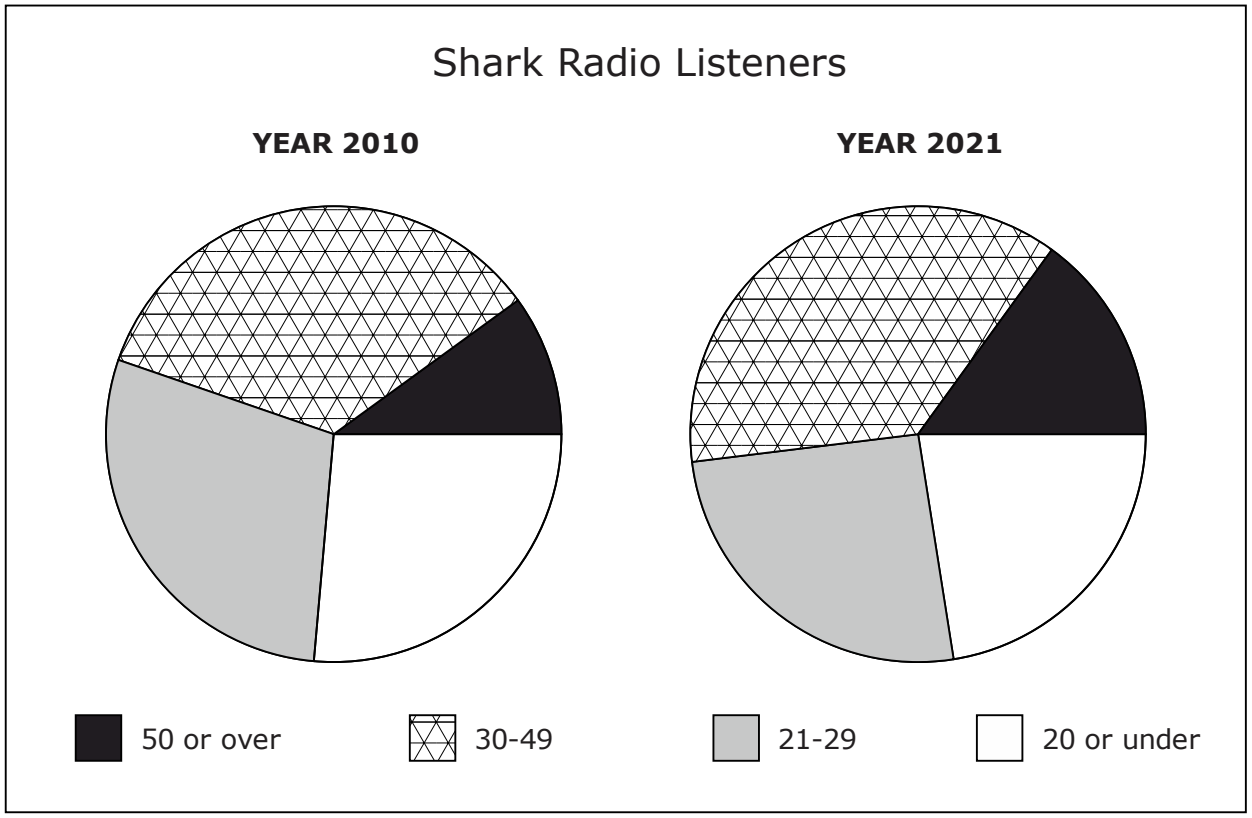
(2)

(e) Express the volume of the empty space as a percentage of the total volume of the box.

(2)

(Total: 10 marks)

7 The pie-charts show information about the age of listeners to Shark Radio in the years 2010 and 2021.



(a) In 2021, what percentage of Shark Radio listeners were aged 50 or over?

(3)

(b) The total number of Shark Radio listeners in 2021 was estimated to be 15000. Estimate the number of listeners who were between 30 and 49 years old.

(3)

(c) Paul says that the pie-charts show that there were more listeners aged 20 or under in 2010 than in 2021. Explain why Paul's conclusion might **not** be correct.

(1)

(Total: 7 marks)

8 Petra is making green paint by mixing blue and yellow paint in the ratio 2:3.

(a) What volume of yellow paint is needed to mix with 9.6 litres of blue paint?

(2)

(b) What volume of yellow paint is needed to make 3 litres of green paint?

(3)

(Total: 5 marks)

9

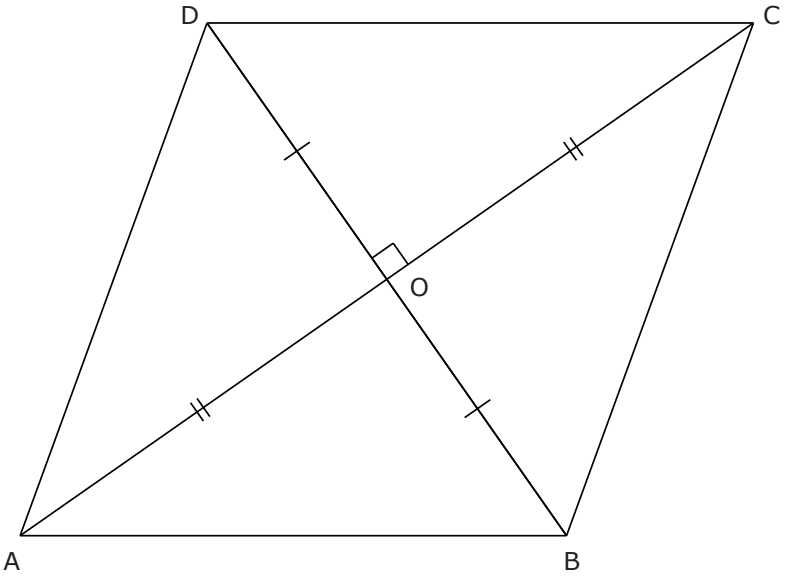


Diagram not drawn to scale

ABCD is a quadrilateral whose diagonals bisect each other at right angles.
The diagonals AC and BD are 20 cm long and 12 cm long respectively.

(a) Work out the length AB.

(3)

(b) Work out the size of ∠ABC.

(4)

(c) Show that the sides of ABCD are **all** equal.

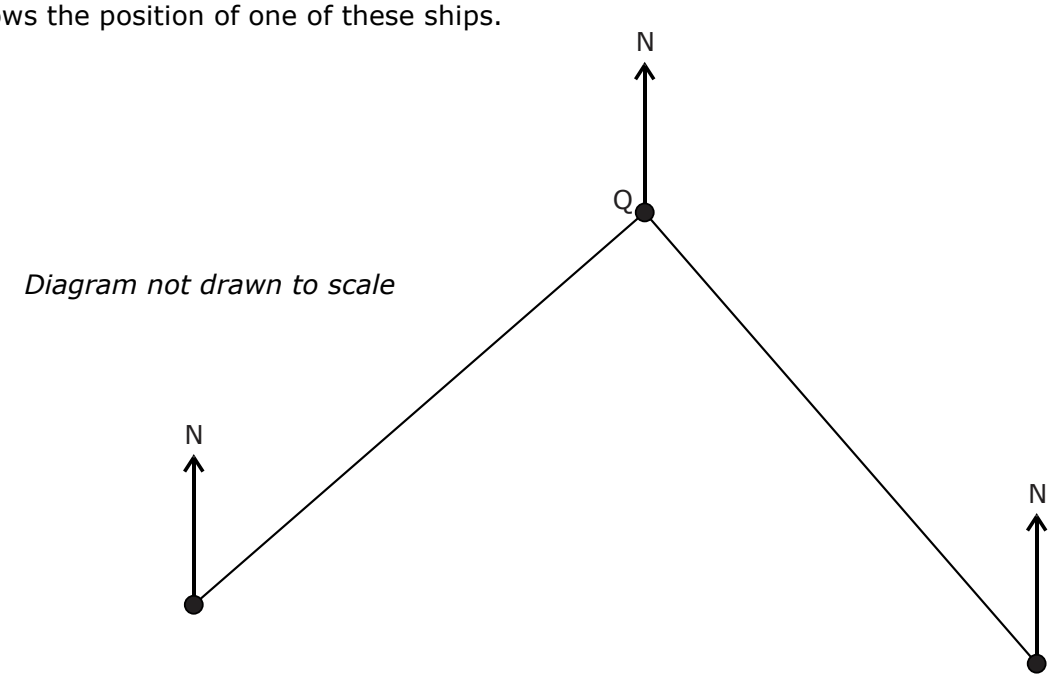
(2)

(d) Fill in the blank space:
Since ABCD has four equal sides, this quadrilateral is called a _____.

(1)

(Total: 10 marks)

10 In the diagram below, the three dots represent the position of three ships.
The point Q shows the position of one of these ships.



The other two ships are at P and R.

P is 150 km away from Q on a bearing of 136°.
Q is 135 km away from R on a bearing of 046°.

(a) On the diagram mark: the position of P, the angle 136°, and the distance 150 km.

(1)

(b) On the diagram mark: the position of R, the angle 46°, and the distance 135 km.

(1)

(c) Show that ∠PQR is equal to 90°. Explain your reasoning.

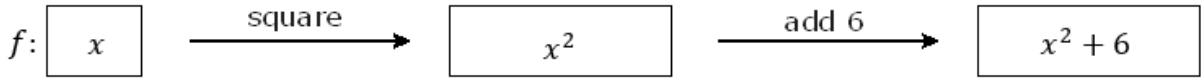
(3)

(d) Work out the distance PR giving your answer correct to the nearest kilometre.

(3)

(Total: 8 marks)

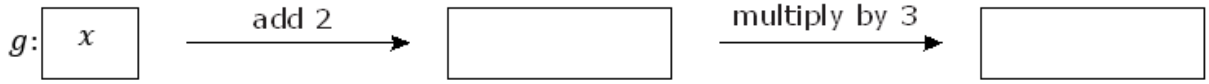
11 (a) The function machine for $f(x) = x^2 + 6$ is shown below.



Work out $f(-2)$.

(1)

(b) The function machine for a function g is shown below.



(i) Complete this function machine by filling in the empty boxes.

(2)

(ii) Work out $g\left(\frac{2}{3}\right)$.

(1)

(iii) Write an expression for $g(x)$ in terms of x.

(1)

(iv) Find the value of x for which $g(x) = 360$.

(2)

(Total: 7 marks)

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L-Università ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

SECONDARY EDUCATION CERTIFICATE LEVEL
2022 SUPPLEMENTARY SESSION

SUBJECT:	**Mathematics**
PAPER NUMBER:	IIB
DATE:	27th August 2022
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 of 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**	**10**
Mark										

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

Total Mark

1 Order these numbers from smallest to greatest:

(a) 0.5174, 5.1, 0.517134, 0.059913, 5.14

(2)

(b) 1.5, 3.5, −3.5, −3.7, −9.5

(2)

(Total: 4 marks)

2 Three friends go out for a meal.
Len orders salmon fillet at €15.00.
Jill orders vegetarian pasta at €10.60.
Carl orders the chef's speciality at €17.00.

(a) Calculate the total cost of the three dishes.

(1)

(b) Len pays the total bill for the three dishes with a €50 note.
How much change does he receive?

(1)

(c) The three friends agree to divide the total cost equally.
How much money should Jill pay Len for her share of the bill?

(2)

(Total: 4 marks)

3 Clara is packing 390 books in boxes.
A full box takes 16 books.

(a) How many boxes can she fill completely?

(2)

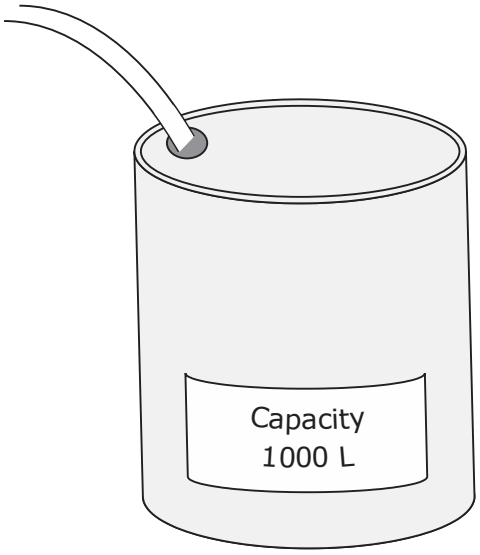
(b) How many books remain when she fills these boxes?

(2)

(Total: 4 marks)

4 An empty water tank has capacity 1000 litres.
It is being filled at the rate of 0.75 litres per second.

How long will it take to fill the tank?
Give your answer to the nearest minute.



(Total: 3 marks)

5 The list below shows the maximum daily temperature, in degrees Celsius, recorded at a mountain resort over a week:

$-5°C,\ 0°C,\ -6°C,\ 2°C,\ -5°C,\ -4°C,\ 3°C$

(a) Work out the mean maximum temperature over this week.

(2)

(b) Work out the median maximum temperature.

(2)

(c) What is the range of the maximum temperature values?

(1)

(Total: 5 marks)

6 Karl has a tool shop.
He uses the following rule to work out the cost of hiring drillers to his clients.

Total hire charge (€) = number of weeks × 125 + 15

(a) Oliver needs to hire a driller for 3 weeks. Work out the total hire charge.

(2)

(b) Emily hires a driller from Karl's shop and pays €890.
For how many weeks will Emily be using this tool?

(3)

(Total: 5 marks)

7 Katya is preparing drinks for a party.
The drinks are prepared from juice cartons each holding 2.5 litres.
She serves fruit juice in cups each holding $\frac{1}{6}$ litre.

(a) How many cups can she serve from a 2.5 litre carton of juice?

(2)

(b) How many 2.5 litre cartons does Katya need to buy in order to prepare 100 cups?

(2)

(Total: 4 marks)

8 The first term of a sequence of numbers is 29.
The term-to-term rule of this sequence is "add 7".

(a) Malcolm says, "No number in this sequence is a multiple of 5".
Give an example to show that Malcolm is wrong.

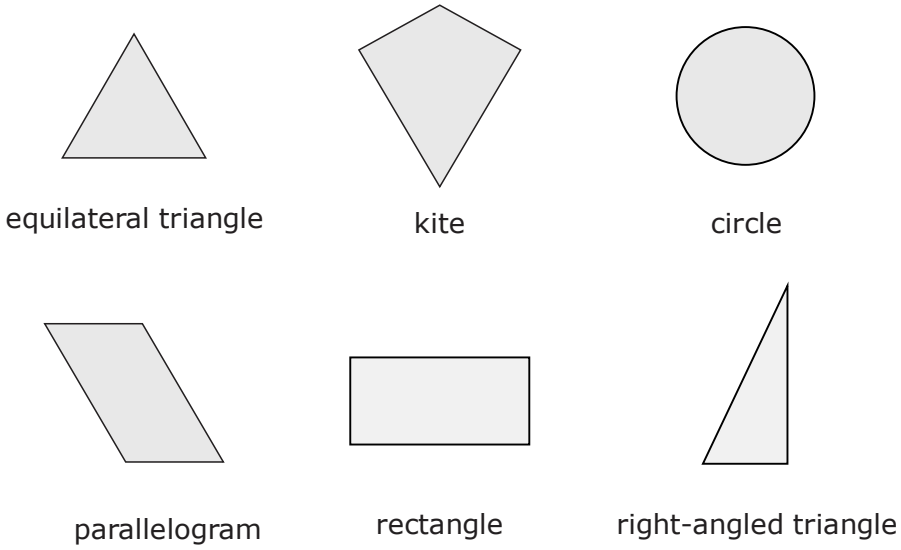
(2)

(b) Work out the value of the n^{th} term of this sequence.

(2)

(Total: 4 marks)

9



Which of the shapes in the figure above has:

(a) more than five lines of reflective symmetry? _____ (1)

(b) three lines of reflective symmetry? _____ (1)

(c) two lines of reflective symmetry and
rotational symmetry of order 2? _____ (1)

(d) one line of reflective symmetry but
no rotational symmetry? _____ (1)

(Total: 4 marks)

10 (a) Colin invests €800 at a rate of 1.6% per year simple interest.
How much interest does he receive in 3 years?

(3)

(b) Sally also invests €800 in an account at simple interest.
Sally receives a total interest of €60 in 3 years.
What is the yearly interest rate of her investment?

(3)

(Total: 6 marks)

11 (a) Solve the equation:

$$5(x-4) = 7x - 9$$

(3)

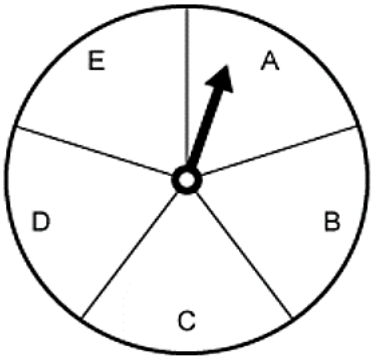
(b) Express as a single fraction:

$$\frac{x}{3} + \frac{2x-1}{6}$$

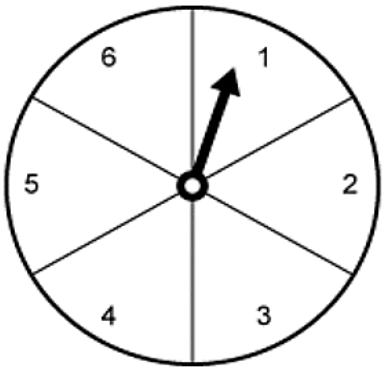
(3)

(Total: 6 marks)

12 The two spinners shown below are tossed together.



Spinner 1



Spinner 2

(a) Complete the possibility space to show **all** the possible outcomes.

Spinner 1

Spinner 2	A	B	C	D	E
1	(A,1)	(B,1)	(C,1)	(D,1)	(E,1)
2					
3					
4					
5					
6					

(2)

(b) What is the probability of getting vowel A on Spinner 1 and an even number on Spinner 2?

(2)

(c) What is the probability of getting a consonant on Spinner 1 and an odd number on Spinner 2?

(2)

(Total: 6 marks)

13 A company has 100 employees.

These employees work in one of two teams, Team A or Team B.

The table shows the number of employees working in each team.

Team A	40 employees
Team B	60 employees

The company plans to send three employees for a short visit abroad.
One employee will be selected at random from Team A.
Two employees will be selected at random from Team B.

Alex works in team A. Brenda works in team B.

(a) What is the probability that Alex is selected?

(1)

(b) What is the probability that Brenda is selected?

(1)

(c) Who is more likely to be selected, Alex or Brenda?
Give a reason for your answer.

(2)

(Total: 4 marks)

14 Solve the two simultaneous equations: $2x + 2y = 40$
$2y = 3x$

(Total: 3 marks)

15 In the diagram below, the shaded rectangle rests at a corner of the larger rectangle.

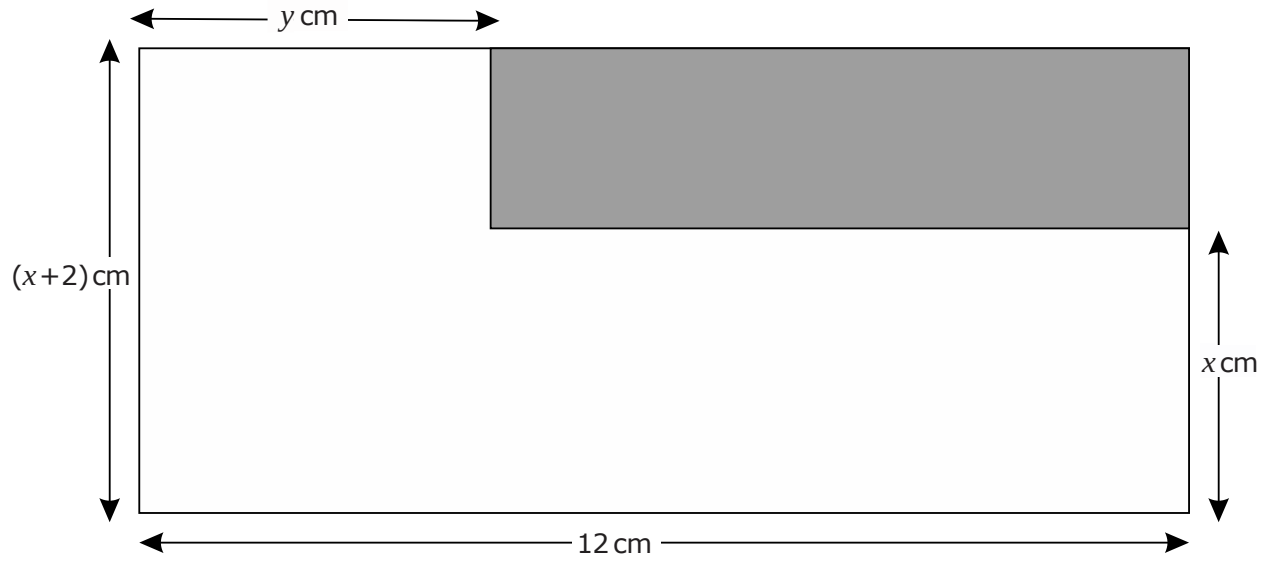


Diagram not drawn to scale

(a) Write down expressions for the:

(i) length of the shaded rectangle;

(1)

(ii) perimeter of the shaded rectangle;

(2)

(iii) perimeter of the larger rectangle.

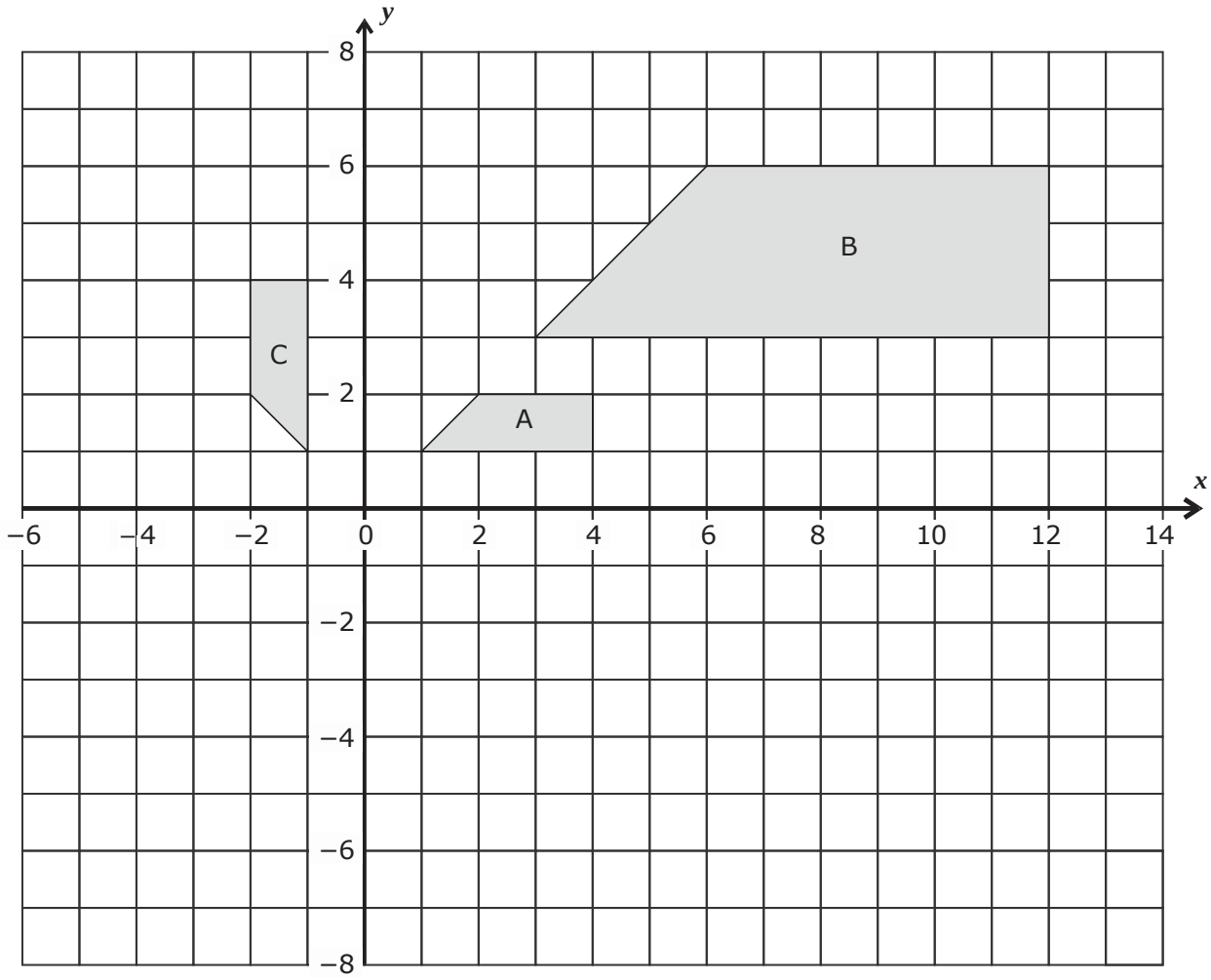
(1)

(b) The perimeter of the larger rectangle is 16 cm **more** than the perimeter of the shaded rectangle. The length shown as y is one and a half times the length shown as x.
Use this information to obtain two equations in terms of x and y.

(2)

(Total: 6 marks)

16



(a) Rotate shape A by 180° about the origin to obtain shape D.

(1)

(b) Reflect shape B in the x-axis to obtain shape E.

(1)

(c) Translate shape C by $\begin{pmatrix} -3 \\ -8 \end{pmatrix}$ to obtain shape F.

(1)

(d) Describe the transformation that maps shape A onto shape B.

(2)

(e) Describe the transformation that maps shape C onto shape A.

(2)

(Total: 7 marks)

17 The figure shows a triangular prism.
The cross-section of the prism is a right-angled triangle with the two shorter sides having lengths 3 cm and 4 cm respectively.
The prism is 9 cm long.

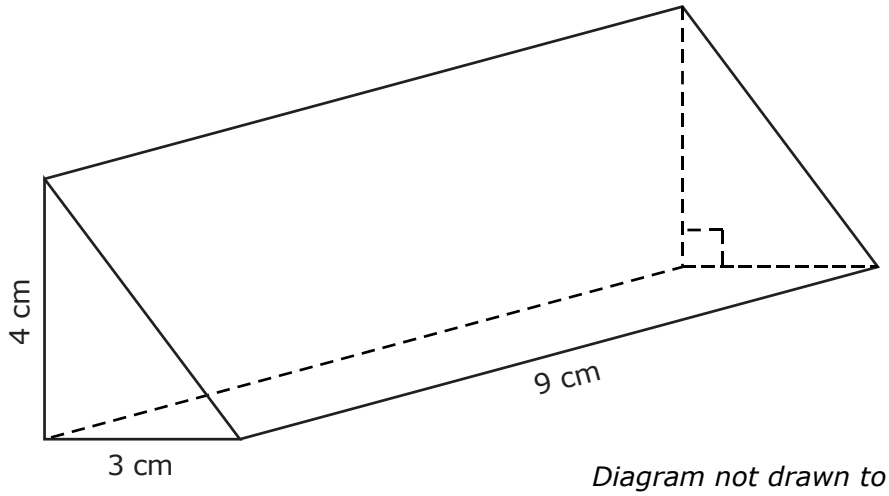


Diagram not drawn to scale

Calculate the total surface area of this prism.
Make sure to give the appropriate units for your answer.

(Total: 6 marks)

18 The diagram shows a circle centre O.
A, B and D are points on the circumference of the circle.
CA and CB are tangents to the circle touching it at A and B respectively.

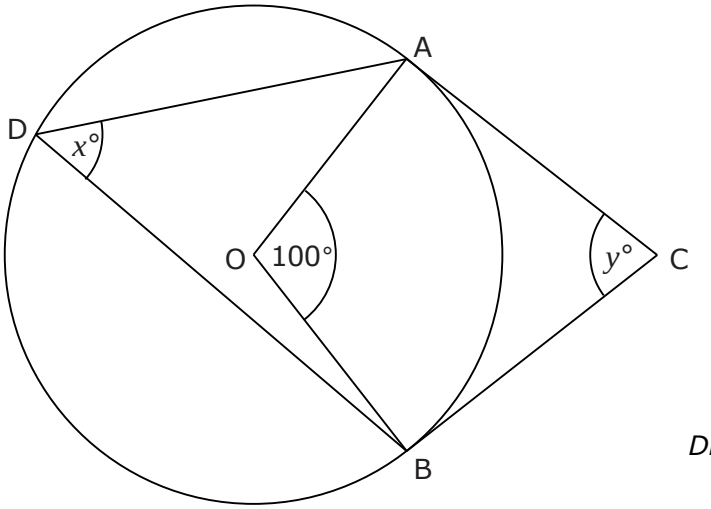


Diagram not drawn to scale

(a) Find the value of x. Explain your working.

(2)

(b) Find the value of y. Explain your working.

(3)

(c) What type of quadrilateral is the shape AOBC?

(1)

(Total: 6 marks)

19 ABC is a triangle whose base BC is 40 cm long.
A line parallel to BC meets AB at X and AC at Y.
XY is 24 cm long and AX is 30 cm long.

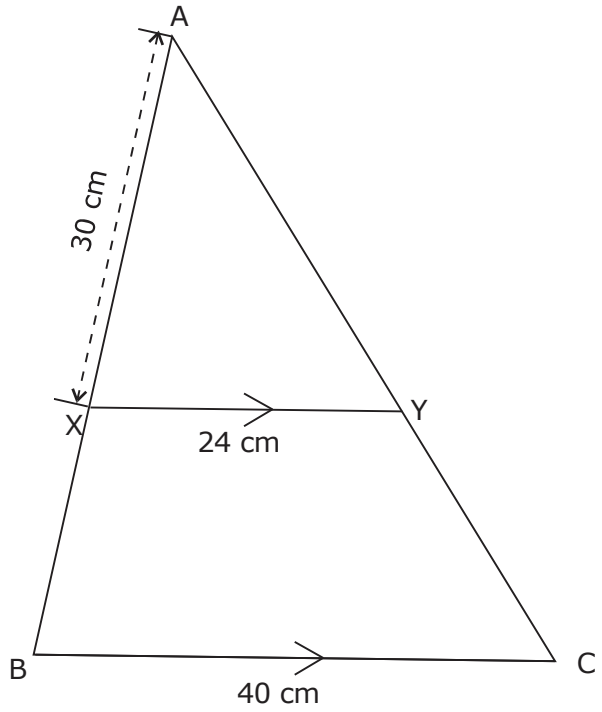


Diagram not drawn to scale

(a) Explain why ΔAXY is similar to ΔABC.

(3)

(b) Work out the length of BX.

(3)

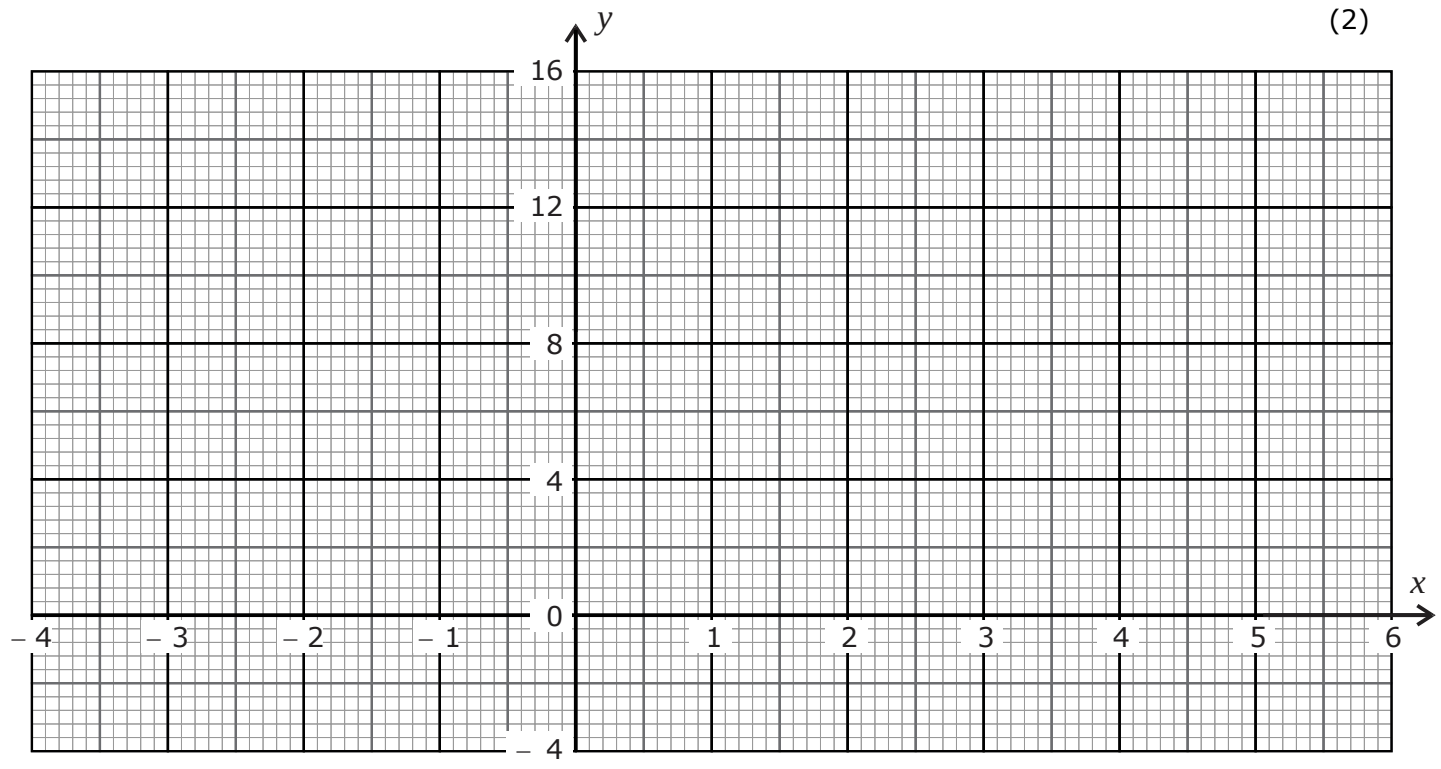
(Total: 6 marks)

20 (a) Complete the following table of values for the equation

$$y = x^2 - 2x - 1$$

x	−3	−2	−1	0	1	2	3	4	5
y	14		2		− 2	− 1			14

(2)



(b) Plot the graph of $y = x^2 - 2x - 1$ for values of x between −3 and 5.

(3)

(c) Use your graph to determine the values of x for which $x^2 - 2x - 1 = 10$.
Give your answers correct to one decimal place.

(2)

(Total: 7 marks)

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