WJEC

INTERMEDIATE TIER

REVISION BOOK

SJHS

SOLUTIONS

SJHS

Contents:

A regular polygon has exterior angles of 45°.

(a) How many sides does this polygon have? [2]

$\frac{360}{45} = 8$

ABCD is a quadrilateral.

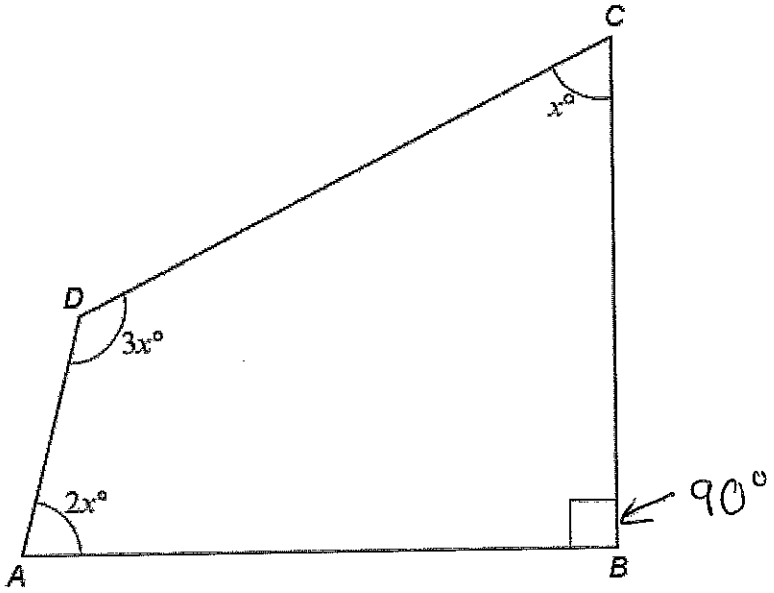


Diagram not drawn to scale

(a) Calculate the value of x. [4]

$3x + 2x + x + 90 = 360$

$6x + 90 = 360$

$-90 \downarrow -90$

$6x = 270°$

$\div 6 \downarrow \div 6$

$x = 45°$

(b) When *ABCD* is drawn to scale, would the lines *AD* and *BC* be parallel or not? You must justify your answer without using a scale drawing. [2]

$B\hat{A}D = 2x = 2 \times 45° = 90°$

$A\hat{B}C = 90°$

∴ parallel

ABCD is a quadrilateral.
$A\hat{B}C = 93°$, $B\hat{C}D = 122°$ and $A\hat{D}C = 85°$.
Points *P* and *Q* lie on the quadrilateral as shown, such that *AP* = *AQ*.

Prove that triangle *APQ* is an equilateral triangle.
You must show all your working. [5]

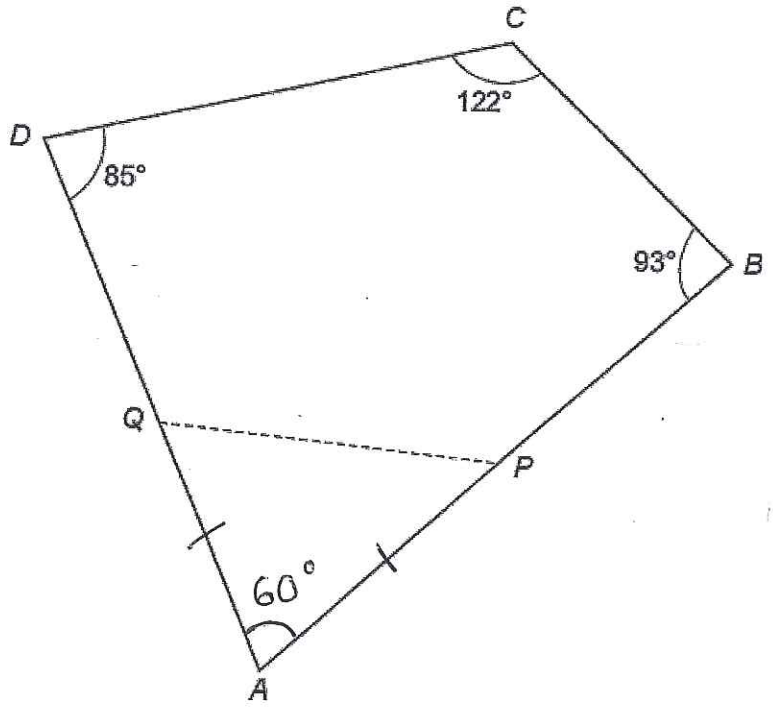


Diagram not drawn to scale

If equilateral all sides same length & angles same size.

$Q\hat{A}P = 360 - (85 + 122 + 93)$

$= 360 - 300$

$= 60°$

$AQ = AP \therefore A\hat{Q}P = A\hat{P}Q$

$(180 - 60) \div 2 = 120 \div 20 = 60°$

All angles the same so equilateral.

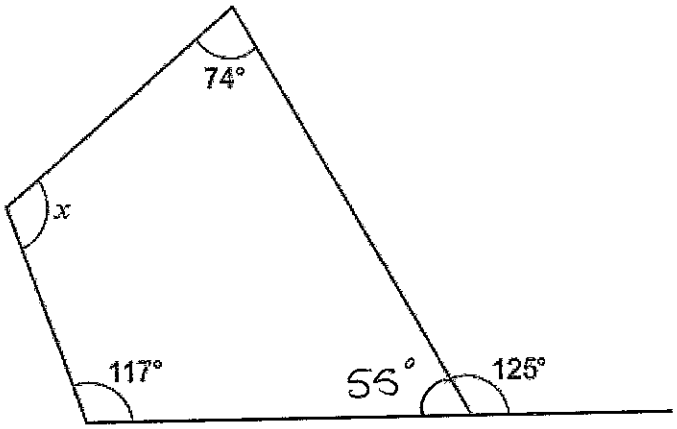


Diagram not drawn to scale

Find the size of angle x. [3]

$180 - 125 = 55°$

$x = 360 - (117 + 74 + 55)$

$= 360 - 246$

$= 114°$

$x =$ 114 °

ABCDE is a regular pentagon with centre *O*.

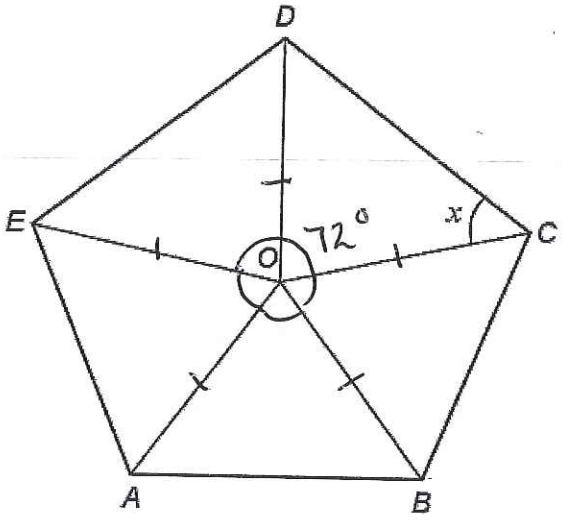


Diagram not drawn to scale

Calculate the size of angle x.
You must show all your working.

[4]

Regular pentagon so all sides same length,
Thus means each triangle is isoceles.

$360 \div 5 = 72°$

$(180 - 72) \div 2$

$= 108 \div 2$

$= 54°$

$x = 54°$

Show that the triangle below is not a right-angled triangle. [5]

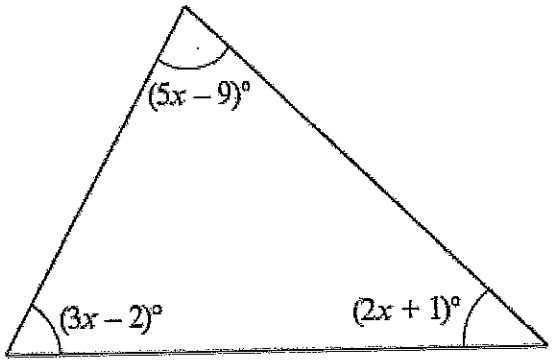


Diagram not drawn to scale

$5x - 9 + 3x - 2 + 2x + 1 = 180$

$10x - 10 = 180$

$+10 \downarrow +10$

$10x = 190$

$\div 10 \downarrow \div 10$

$x = 19°$

$5x - 9 = 5 \times 19 - 9 = 86°$

$3x - 2 = 3 \times 19 - 2 = 55°$

$2x + 1 = 2 \times 19 + 1 = 39°$

} not 90° ∴ not right angle

ABC is an isosceles triangle with *AB* = *AC*.

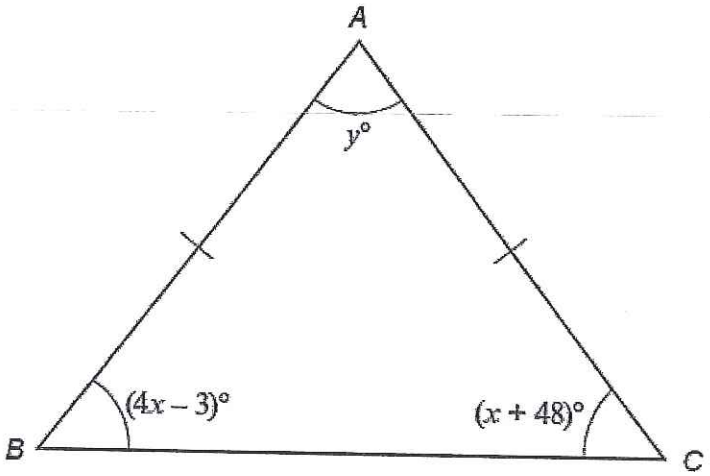


Diagram not drawn to scale

Calculate the value of y. [6]

Isoceles so:

$4x - 3 = x + 48$

$-x \downarrow -x$

$3x - 3 = 48$

$+3 \downarrow +3$

$3x = 51$

$\div 3 \downarrow \div 3$

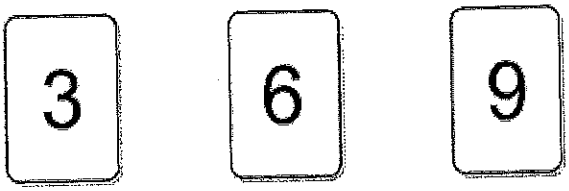
$x = 17$

$4x - 3 = 4 \times 17 - 3 = 65°$

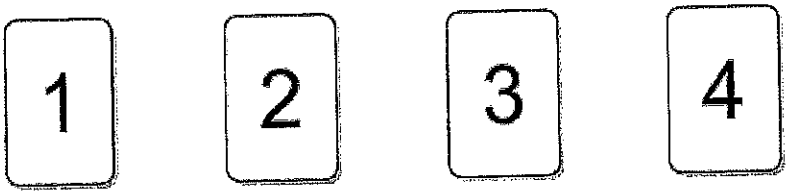
$180 - (65 + 65) = 180 - 130 = 50°$

$y = 50°$

Three **red** cards have the following numbers written on them.



Four **green** cards have the following numbers written on them.



In a game, the cards are turned face down.
A player chooses one red card and one green card at random.
The player's score is the sum of the two numbers.

In a game, the cards are turned face down.
A player chooses one red card and one green card at random.
The player's score is the sum of the two numbers.

(a) Complete the following table. [1]

Red card \ Green card	1	2	3	4
9	10	11	12	13
6	7	8	9	10
3	4	5	6	7

Score

(b) A player wins a prize if the score is more than 9.
Safira plays the game once. What is the probability that she wins a prize? [2]

$\frac{5}{12}$

(c) 60 people play the game once.
Approximately how many people would you expect to win a prize? [2]

$\frac{5}{12} \times 60 = \frac{60}{12} \times 5 = 5 \times 5 = 25$

10. Ceri has a set of cards.
Each of her cards is labelled North, East, South or West.

(a) Ceri chooses one card at random from her set of cards.
Complete the table below to find the probability of Ceri choosing a card labelled West.
[2]

Label	North	East	South	West
Probability	0·4	0·25	0·2	0.15

$1 - (0.4 + 0.25 + 0.2)$
$= 1 - 0.85$
$= 0.15$

(b) Ceri chooses one card at random from her set of cards.

What is the probability that the card is labelled East or South? [2]

Or + $0.25 + 0.2 = 0.45$

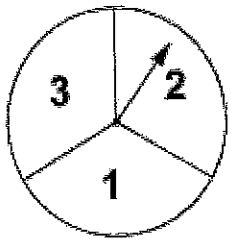
(c) Sasha has an identical set of cards.
Ceri and Sasha each choose one card at random from their set of cards.

What is the probability that they both choose a card labelled North? [2]

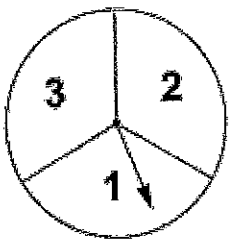
B = x $0.4 \times 0.4 = 0.16$

Sara is in charge of a game at her school's Christmas party.

Two fair spinners are spun as shown in the example below.



1st Spinner



2nd Spinner

People can make a two-digit number using the numbers shown on the spinners using the following rule:

> Multiply the number on the first spinner by 10 and then add the number on the second spinner.

One example, as shown above, makes the number 21, because $2 \times 10 + 1 = 21$.

(a) How many different numbers can be made playing this game? [1]

$1 \times 10 + 1 = 11$ $2 \times 10 + 1 = 21$ $3 \times 10 + 1 = 31$

$1 \times 10 + 2 = 12$ $2 \times 10 + 2 = 22$ $3 \times 10 + 2 = 32$

$1 \times 10 + 3 = 13$ $2 \times 10 + 3 = 23$ $3 \times 10 + 3 = 33$

9

(b) Write down all the prime numbers that can be made playing this game. [2]

Prime number only divisible by one & itself

11, 13, 23, 31

(c) What is the probability that a person makes a prime number when playing the game once? [2]

$\frac{4}{9}$

(a) A fair, six-sided dice is rolled.
What is the probability that a 4 is shown on the dice?
Circle your answer. [1]

6% $\frac{1}{5}$ $\frac{1}{4}$ 6:1 $\frac{1}{6}$

(b) 50 raffle tickets were sold at a charity event.
Sian has a 20% chance of winning the top prize.
How many tickets did Sian buy?
Circle your answer. [1]

1 2 4 10 20

$20\% = \frac{20}{100} = 0.2$ $50 \times 0.2 = 10$

(c) A bag contains a mixture of blue beads, yellow beads and pink beads.
One bead is taken at random from the bag.

The probability that the bead is pink is $\frac{1}{5}$.

Which of the following sets of beads could have been in the bag?
Circle your answer. [1]

$6+6+3=15$ $\frac{3}{15} = \frac{1}{5}$

$5+5+5=15$ $\frac{5}{15} = \frac{1}{3}$

$5+1+1=7$ $\frac{5}{7}$

$5+5+1=11$ $\frac{1}{11}$

$6+3+6=15$ $\frac{6}{15} = \frac{2}{5}$

A fair six-sided dice and a fair coin are thrown together once.

Circle the correct answer for each of the following statements.

(a) The number of possible outcomes is $6 \times 2 = 12$ [1]

2 6 8 (12) 24.

(b) The probability of getting a 4 on the dice and a tail on the coin is $\frac{1}{6} \times \frac{1}{2} = \frac{1}{12}$ [1]

$\frac{1}{8}$ ($\frac{1}{12}$) $\frac{1}{2}$ $\frac{1}{6}$ $\frac{1}{24}$.

(c) The probability of getting a **multiple of 3** on the dice and a **head** on the coin is [1] $\frac{2}{6} \times \frac{1}{2} = \frac{2}{12} = \frac{1}{6}$

$\frac{1}{8}$ $\frac{1}{12}$ $\frac{1}{2}$ ($\frac{1}{6}$) $\frac{1}{24}$.

Space for working:

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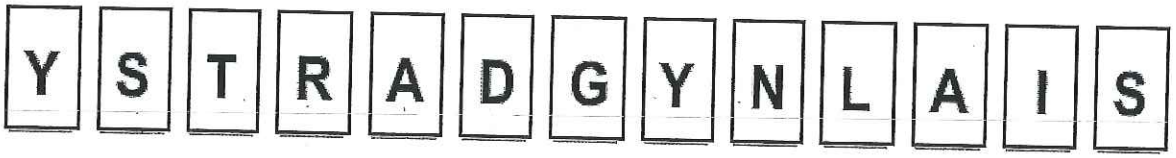
7. The following cards spell out the name Ystradgynlais.



In an experiment, the cards are turned face down and rearranged.
A card is selected at random and the letter on the card is recorded.

The experiment is carried out 325 times.

How many times would you expect the letter **Y** to be recorded? [3]

$P(Y) = \frac{2}{13}$

$\frac{2}{13} \times 325 = \frac{325}{13} \times 2 = 50$

WJEC INTERMEDIATE TIER USING KNOWN FACTS WORKSHEET

(a) Estimate the value of $\frac{41{\cdot}3 \times 29{\cdot}6}{198{\cdot}7}$.

You must show all your working. [2]

$\frac{40 \times 30}{200} = \frac{1200}{200} = 6$

(b) Given that $54 \times 84{\cdot}2 = 4546{\cdot}8$, write down the exact value of each of the following.

(i) 540×842 = 454680 [1]

(ii) $\frac{4546{\cdot}8}{5{\cdot}4}$ = 842 [1]

(iii) $\frac{454{\cdot}68}{84{\cdot}2}$ = 5.4 [1]

A whole number is written on a card.

You are given three clues to help you work out the number on the card.

Clue 1 : Double the number is between 8 and 18 inclusive.

Clue 2 : The number is a prime number.

Clue 3 : The number is not a factor of 100.

What is the number on the card?
You must show all your working.

[3]

Clue 1: $\frac{8}{2} = 4$ $\frac{10}{2} = 5$ $\frac{12}{2} = 6$ $\frac{14}{2} = 7$ $\frac{16}{2} = 8$ $\frac{18}{2} = 9$

Clue 2: ~~4~~, 5, ~~6~~, 7, ~~8~~, ~~9~~

Clue 3: ~~$\frac{100}{5} = 20$~~ $\frac{100}{7} = 14.3$

The number on the card is 7

A fraction is written as $\frac{a}{b}$.

- The fraction is a multiple of 0·2.
- The fraction is greater than $\frac{1}{2}$.
- The fraction is less than 75%.

Write down the fraction as $\frac{a}{b}$, where a and b are whole numbers. [3]

- $0.2 = \frac{2}{10}$ Multiples of $0.2 = \frac{2}{10}, \frac{4}{10}, \frac{6}{10}, \frac{8}{10}$ .....
- Greater than $\frac{1}{2}$: $\frac{6}{10}, \frac{8}{10}$ .....
- Less than 75% $(\frac{75}{100})$: $\frac{6}{10}$

Answer = $\frac{6}{10} = \frac{3}{5}$

Look at the following descriptions of special quadrilateral shapes.
Circle the correct name for each one.

(a) Its diagonals intersect at 90°.
Only one diagonal is a line of symmetry. [1]

(Kite) Rhombus Square Trapezium Rectangle

(b) Only one pair of sides are parallel. [1]

Kite Rhombus Square (Trapezium) Rectangle

(c) All four sides are equal.
Its diagonals are not equal in length. [1]

Kite (Rhombus) Square Trapezium Rectangle

WJEC INTERMEDIATE TIER SEQUENCES WORKSHEET

(a) Write down the next two numbers in the following sequence. [2]

33 (−7) 26 (−7) 19 (−7) 12 (−7) 5 (−7) −2

.....

.....

(a) Write down the next two numbers in the following sequence. [2]

35, (−10) 25, (−9) 16, (−8) 8, (−7) 1, (−6) −5

.....

.....

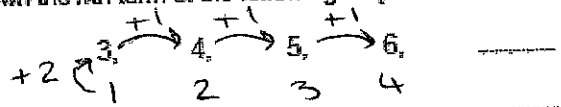
(a) Write down the next two numbers in the following sequence. [2]

22 (−1) 21 (−3) 18 (−5) 13 (−7) 6 (−9) −3

.....

.....

(a) Write down the *n*th term of the following sequence. [2]



$n + 2$

(b) The *n*th term of a different sequence is given by $n^2 + 7$.

(i) Write down the first three terms of this sequence. [2]

$1^2 + 7 = 1 + 7 = 8$

$2^2 + 7 = 4 + 7 = 11$

$3^2 + 7 = 9 + 7 = 16$

1st term = 8 2nd term = 11 3rd term = 16

(ii) Which term in this sequence is the first that has a value greater than 85? [2]

$n^2 + 7 > 85$

$-7 \downarrow -7$

$n^2 > 78$

$\sqrt{\ } \downarrow \sqrt{\ }$

$n > 8.8$

9th

Answer = 9th term.

(a) Write down the first three terms of the sequence whose *n*th term is given by $2n - 5$. [2]

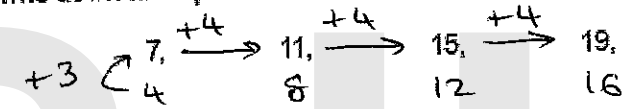
$2(1) - 5 = 2 - 5 = -3$

$2(2) - 5 = 4 - 5 = -1$

$2(3) - 5 = 6 - 5 = 1$

The first three terms are -3, -1 and 1

(b) Write down an expression for the *n*th term of the following sequence. [2]



$4n + 3$

(b) Write down the nth term of the following sequence. [2]

+2 +2 +2

3, +3→ 6, +5→ 11, +7→ 18, +9→ 27, ...

+2 ↷ 1 4 9 16 25

$n^2 + 2$

11. *(a)* The table below shows some of the values of $y = 2x^2 - 5x - 1$ for values of x from -2 to 4.

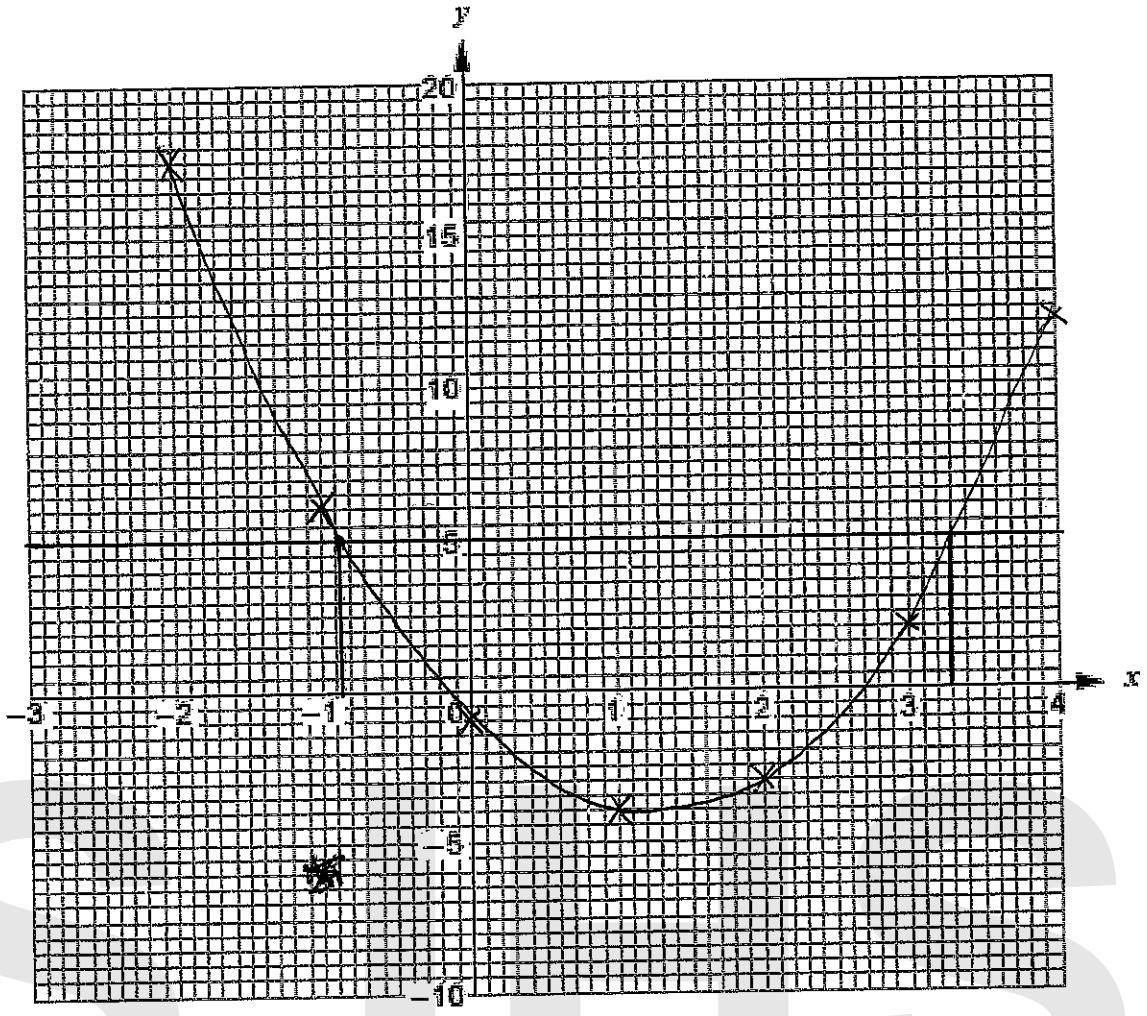
Complete the table by finding the value of y for $x = -1$ and for $x = 2$. [2]

x	-2	-1	0	1	2	3	4
$y = 2x^2 - 5x - 1$	17	6	-1	-4	-3	2	11

$y = 2x-1^2 - 5x-1-1$
$= 2x1 - 5x-1-1$
$= 2+5-1$
$= 6$

$y = 2x2^2 - 5x2-1$
$= 2x4 - 5x2-1$
$= 8 - 10 - 1$
$= -3$

(b) On the graph paper below, draw the graph of $y = 2x^2 - 5x - 1$ for values of x from -2 to 4. [2]



(c) Draw the line $y = 5$ on the graph paper.

Write down the values of x where the line $y = 5$ cuts the curve $y = 2x^2 - 5x - 1$.
Give your answers correct to 1 decimal place. [2]

Values of x are -0.9 and 3.2

(d) Circle the equation below whose solutions are the values you have given in (c). [1]

$2x^2 - 5x - 1 = 0$ $2x^2 - 5x - 6 = 0$ $2x^2 - 5x - 5 = 0$

$2x^2 - x - 1 = 0$ $2x^2 - 5x + 4 = 0$

11. The table below shows some of the values of $y = x^2 - 5x + 2$, for values of x from -1 to 5.

x	-1	0	1	2	3	4	5
$y = x^2 - 5x + 2$	8	2	-2	-4	-4	-2	2

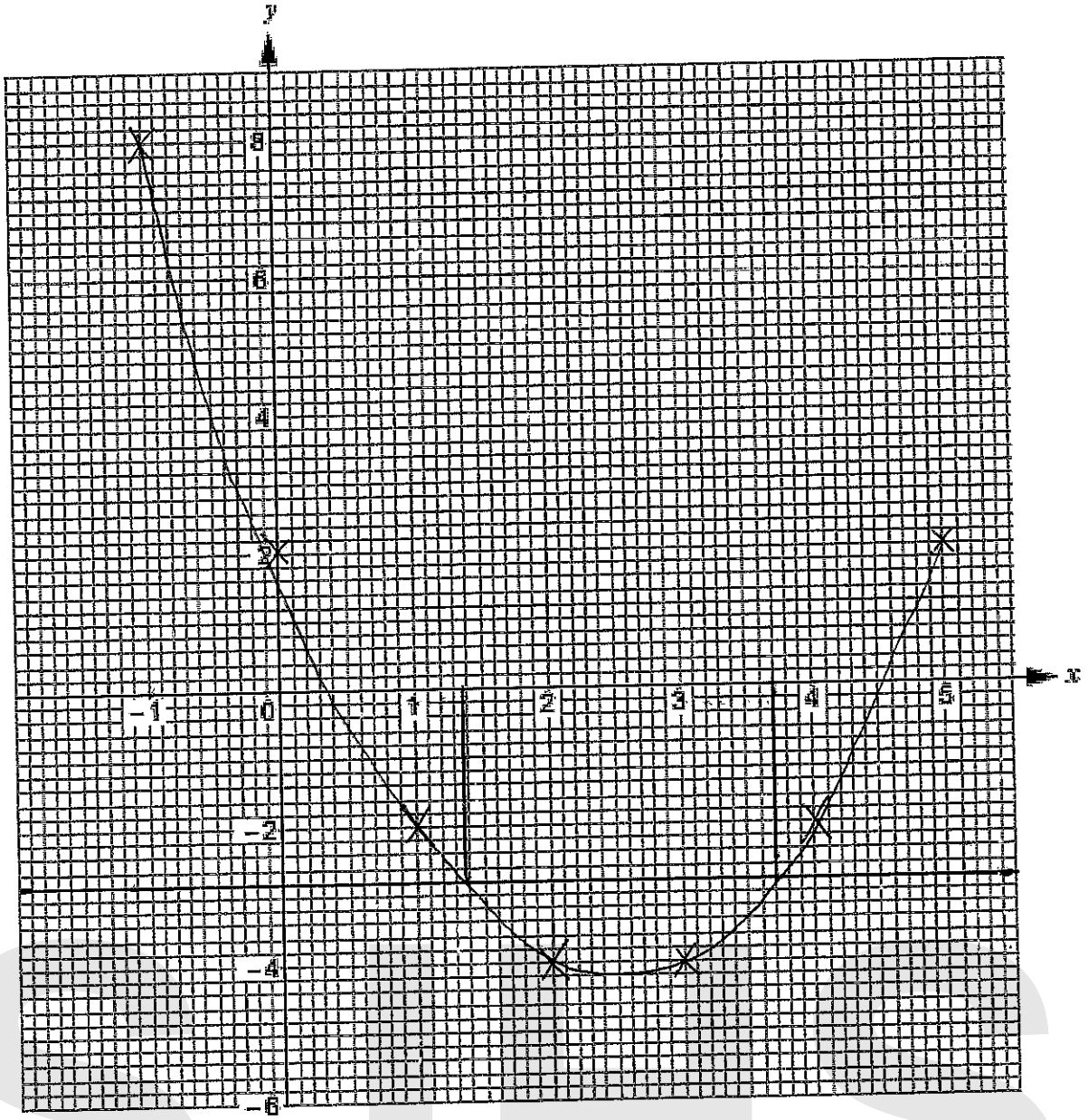
(a) Complete the table above. [1]

$y = 3^2 - 5 \times 3 + 2$

$= 9 - 5 \times 3 + 2$

$= 9 - 15 + 2 = -4$

(b) On the graph paper below, draw the graph of $y = x^2 - 5x + 2$ for values of x from -1 to 5. [2]



(c) Draw the line $y = -3$ on the graph paper.

Write down the values of x where the line $y = -3$ cuts the curve $y = x^2 - 5x + 2$.
Give your answers correct to 1 decimal place. [2]

Values of x are 1.4 and 3.7

(a) Complete the table below.
Draw the graph of $y = 2x^2 - 5$ for values of x between -2 and 3.
Use the graph paper below.
Choose a suitable scale for the y-axis. [4]

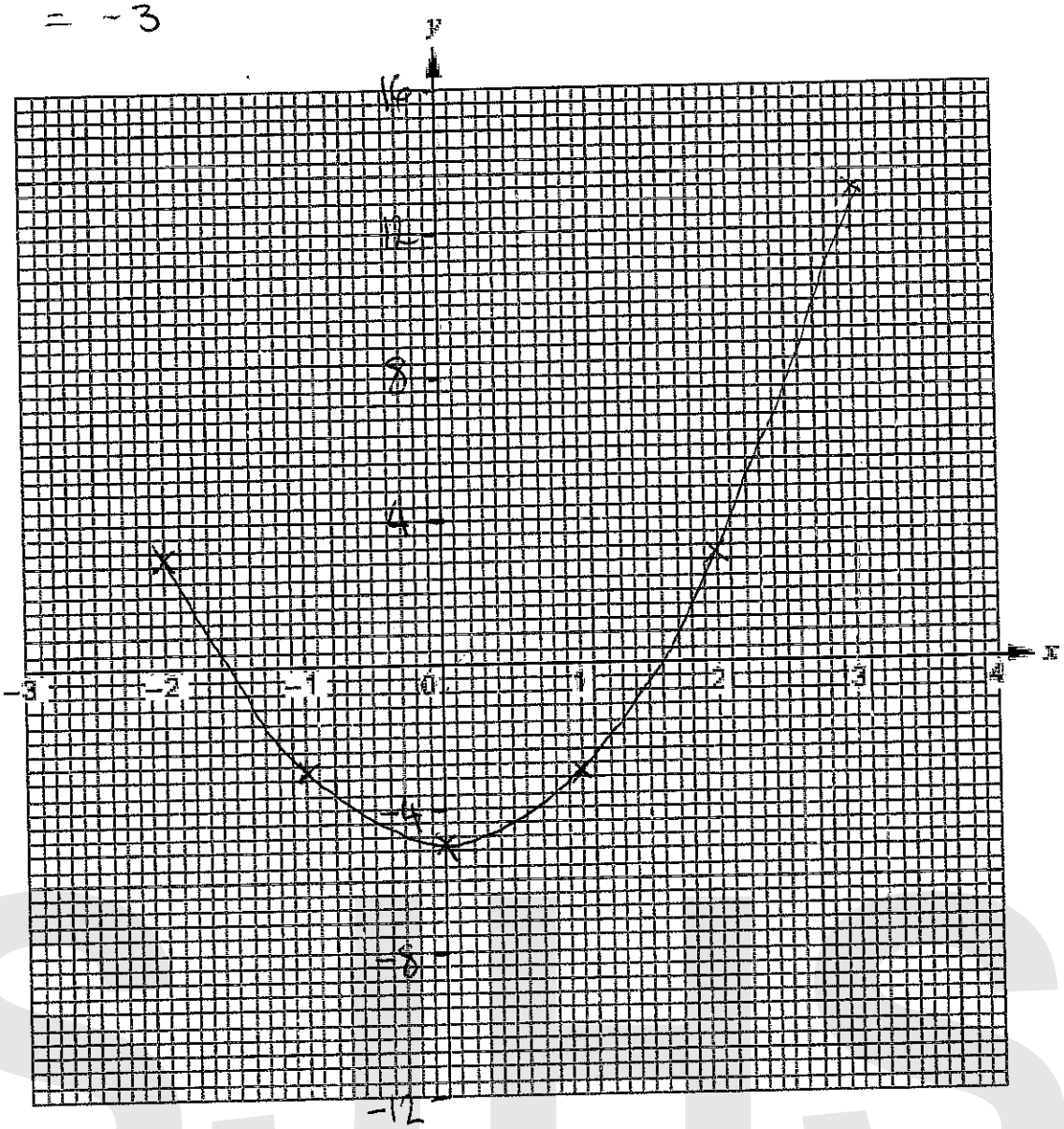
x	-2	-1	0	1	2	3
$y = 2x^2 - 5$	3	-3	-5	-3	3	13

$y = 2x-1^2-5$

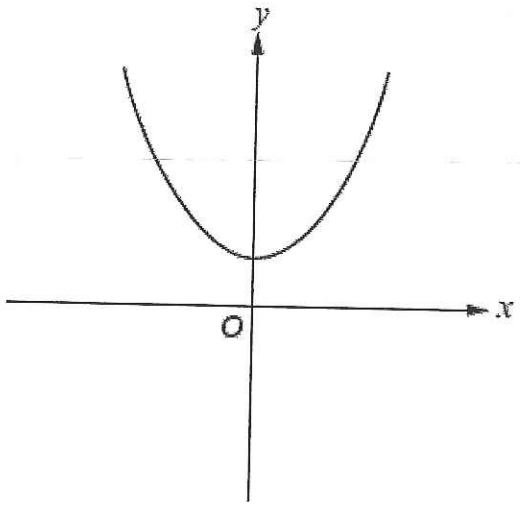
$= 2 \times 1 - 5$

$= 2 - 5$

$= -3$



(b)



The sketch above can represent only one of the equations given below.
Circle this equation.

[1]

$y = x^2$ $\quad$ $y = x^2 - 3$ $\quad$ $y = -x^2$ $\quad$ $y = x^2 + 3$ $\quad$ $y = 3x$

WJEC INTERMEDIATE TIER STANDARD FORM WORKSHEET

Find, in standard form, the value of each of the following.

(a) $\frac{7{\cdot}5 \times 10^6}{5000}$ [2]

$\frac{7.5 \times 10^6}{5000} = \frac{7.5 \times 10^6}{5 \times 10^3} = (7.5 \div 5) \times (10^6 \div 10^3)$

$= 1.5 \times 10^3$

(b) $(2{\cdot}3 \times 10^3) + (6{\cdot}4 \times 10^4)$ [2]

$2300 + 64000 = 66300 = 6.63 \times 10^4$

Calculate the value of $(5{\cdot}41 \times 10^5) + (2{\cdot}3 \times 10^4)$.
Give your answer in standard form. [2]

$541000 + 23000 = 564000$

$= 5.64 \times 10^5$

(a) Express 0·00042 in standard form. [1]

4.2×10^{-4}

(b) Calculate the value of $\frac{7.2 \times 10^6}{2 \times 10^{-2}}$.

Give your answer in standard form. [1]

$(7.2 \div 2) \times (10^6 \div 10^{-2})$

$= 3.6 \times 10^8$

(c) Calculate the value of $(4.7 \times 10^5) - (6.2 \times 10^4)$.

Give your answer in standard form. [2]

$470000 - 62000 = 470000$

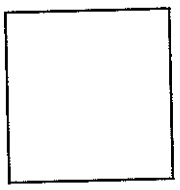
$- 62000$

408000

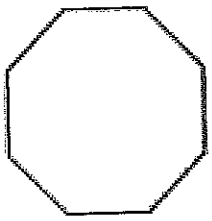
$= 4.08 \times 10^5$

WJEC INTERMEDIATE TIER SIMULTANEOUS EQUATIONS WORKSHEET

Each side of a square is of length $(2x + 3y)$ cm.
The perimeter of the square is 62 cm.



Each side of a regular octagon is of length $(x + 2y)$ cm.
The perimeter of the octagon is 72cm.



Use an algebraic method to find the value of x and the value of y. [5]

Calculate perimeter by adding all sides together.

Square: $4(2x+3y) = 8x+12y$ } Simultaneous equations = 62
Octagon: $8(x+2y) = 8x+16y$ } = 72

$8x + 16y = 72$
$-8x + 12y = 62$
$4y = 10$
$\div 4 \downarrow \div 4$
$y = 2.5$ cm

$8x + 12 \times 2.5 = 62$
$8x + 30 = 62$
$30 \downarrow -30$
$8x = 32$
$\div 8 \downarrow \div 8$
$x = 4$ cm

$x =$ 4 cm $\quad y =$ 2.5 cm

Solve the following simultaneous equations using an algebraic (not graphical) method. [4]

$$3x + 4y = 7$$
$$2x - 3y = 16$$

$3x + 4y = 7 \quad \times 2$

$2x - 3y = 16 \quad \times 3$

$6x + 8y = 14$

$- \; 6x - 9y = 48$

$17y = -34$

$\div 17 \downarrow \div 17$

$y = -2$

$2x - 3x - 2 = 16$

$2x + 6 = 16$

$-6 \downarrow -6$

$2x = 10$

$\div 2 \downarrow \div 2$

$x = 5$

Solve the following simultaneous equations using an algebraic (not graphical) method. [4]

$$4x - 3y = 2$$
$$6x - 5y = 1$$

$4x - 3y = 2 \quad \times 6$

$6x - 5y = 1 \quad \times 4$

$24x - 18y = 12$

$-\ 24x - 20y = 4$

$2y = 8$

$\div 2 \downarrow \div 2$

$y = 4$

$4x - 3 \times 4 = 2$

$4x - 12 = 2$

$+12 \downarrow +12$

$4x = 14$

$\div 4 \downarrow \div 4$

$x = 3.5$

WJEC INTERMEDIATE TIER EXPANDING BRACKETS WORKSHEET

Circle the correct answer for each of the following.

(a) $x^3 \times x^6 =$ $x^{3+6} = x^9$ [1]

x^{36} $x^{0.5}$ x^2 x^9 x^{18}

(b) $(7x - 5y) - (3x + 2y) =$ $7x - 5y - 3x - 2y$ [1]

$4x - 3y$ $4x - 7y$ $4x + 3y$ $-4x + 7y$ $-4x - 7y$

(c) A car travels x miles in 30 minutes.
Its average speed in miles per hour is [1]

$\frac{x}{2}$ $\frac{x}{30}$ $2x$ $\frac{2}{x}$ $30x$

$s = \frac{d}{t} = \frac{x}{0.5} = 2x$

(a) Factorise $x^3 - 5x$. [1]

$x(x^2 - 5)$

(b) Expand and simplify $(2x - 3)(x + 4)$. [2]

F = $2x \times x = 2x^2$

O = $2x \times 4 = 8x$

I = $-3 \times x = -3x$

L = $-3 \times 4 = -12$

$= 2x^2 + 5x - 12$

(c) Factorise $x^2 - 3x - 28$. [2]

$s = -3$ $(x + 4)(x - 7)$

$p = -28$

1, 28

2, 14

4, -7

(a) Write down the next two numbers in the following sequence. [2]

22 $\xrightarrow{-1}$ 21 $\xrightarrow{-3}$ 18 $\xrightarrow{-5}$ 13 $\xrightarrow{-7}$ 6 $\xrightarrow{-9}$ -3

(b) Expand $5(3x-2)$. [1]

$15x - 10$

(c) Solve $9x + 3 = 4x + 5$. [3]

$-4x \downarrow -4x$

$5x + 3 = 5$

$-3 \downarrow -3$

$5x = 2$

$\div 5 \downarrow \div 5$

$x = \frac{2}{5} = 0.4$

WJEC INTERMEDIATE TIER REVERSE PERIMETER/AREA/VOLUME WORKSHEET

In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.

A right-angled triangle *BCD* is joined to a rectangle *ABDE*, as shown below.

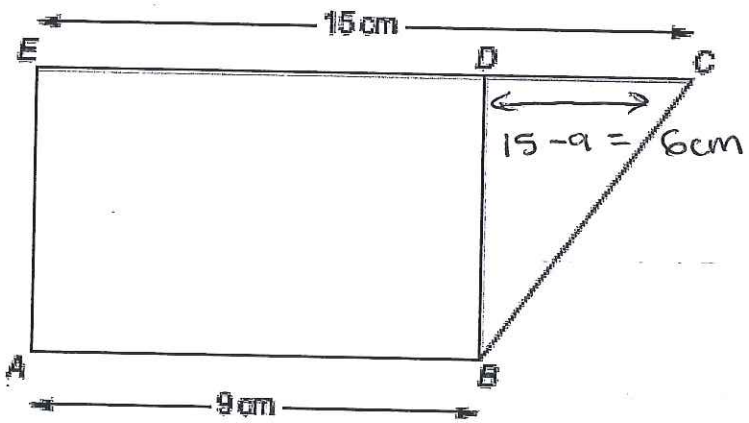


Diagram not drawn to scale

The area of the rectangle is 45 cm².

Calculate the area of the right-angled triangle.
You must show your working.

[5 + 2 OCW]

$A\square = b \times h$

$45 = 9 \times h$

$\div 9 \downarrow \div 9$

$5\text{ cm} = h$

$A\triangle = \frac{b \times h}{2}$

$= \frac{6 \times 5}{2}$

$= 15\text{ cm}^2$

In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.

In the diagram below,

- *ABCD* is a rectangle, and
- *PQ* is parallel to *AD*.

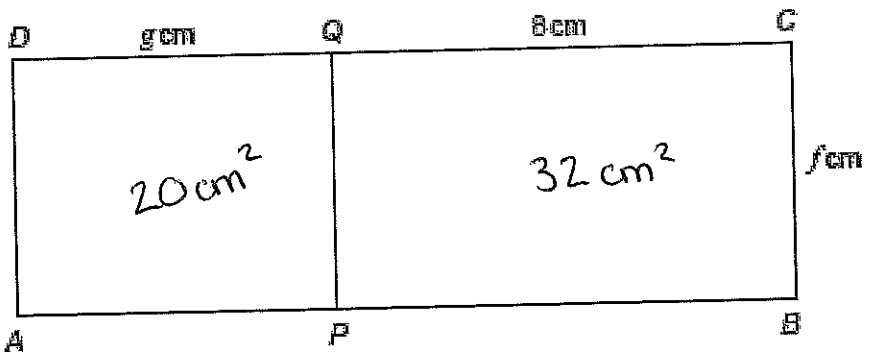


Diagram not drawn to scale

The area of *ABCD* is 52 cm^2.
The area of *APQD* is 20 cm^2.

Calculate the values of *f* and *g*.
You must show all your working. [5 + 2 OCW]

$52 - 20 = 32 \text{ cm}^2$

$A \square = b \times h$

$32 = 8 \times f$

$\div 8 \downarrow \div 8$

$4 \text{ cm} = f$

$A \square = b \times h$

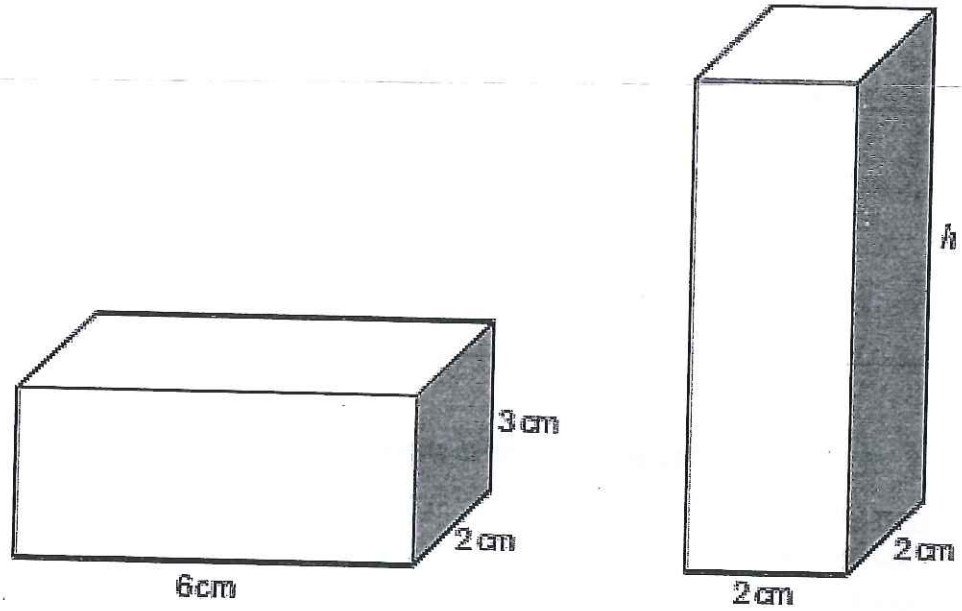
$20 = g \times 4$

$\div 4 \downarrow \div 4$

$5 \text{ cm} = g$

(a) *In this part of the question, you will be assessed on the quality of your organisation, communication and accuracy in writing.*

The two cuboids shown below have equal volumes.



Diagrams not drawn to scale

Calculate the height h of Cuboid B.
You must show all your working.

[4 ÷ 2 OCW]

$V(A) = b \times h \times l$

$= 6 \times 3 \times 2$

$= 36\ cm^3$

$V(B) = b \times h \times l$

$36 = 2 \times h \times 2$

$36 = 4 \times h$

$\div 4 \downarrow \div 4$

$9\ cm = h$

(b) How many cubic centimetres (cm^3) are there in 2·5 litres?

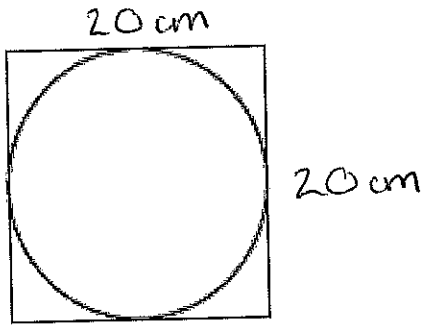
[1]

$1000\ cm^3 = 1$ litre

$2.5\ l = 1000 \times 2.5 = 2500\ cm^3$

In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.

A square has a perimeter of 80 cm.
A circle fits exactly inside the square, as shown in the diagram.



Calculate the circumference of the circle.
Give your answer correct to 1 decimal place.
You must show your working. [4 + 2 OCW]

length of side = $\frac{80}{4}$ = 20 cm

length = diameter = 20 cm

C = π x d

= π x 20

= 62.8 cm

In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.

ABCF is a rectangle.
CDEF is a trapezium.
BD is a straight line.

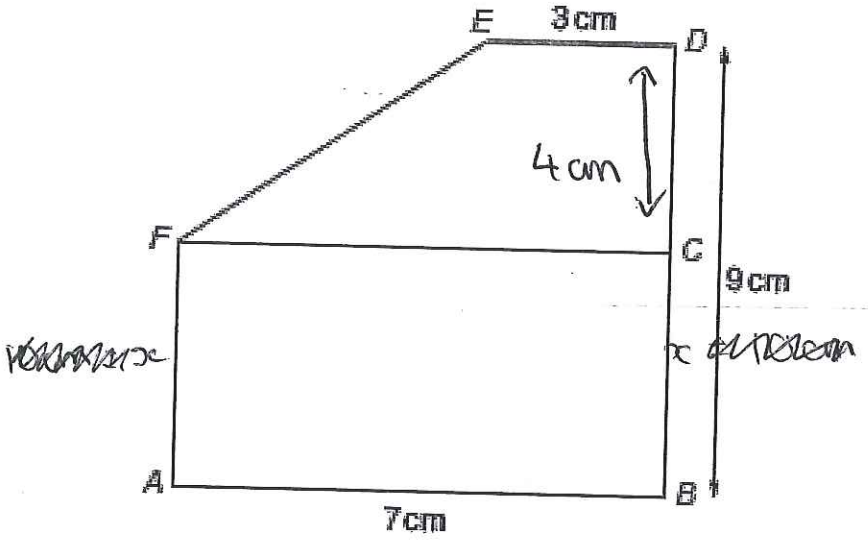


Diagram not drawn to scale

AB = 7 cm, *BD* = 9 cm and *DE* = 3 cm.

The perimeter of rectangle *ABCF* is 24 cm.

Calculate the area of the trapezium *CDEF*.
You must show all your working.

[4 + 2 OCW]

Perimeter □ = 7 + 7 + x + x

24 = 14 + 2x

−14 ↓ −14

10 = 2x

÷2 ↓ ÷2

5 cm = x

9 − 5 = 4 cm

Area ⏢ = $\frac{(a+b)}{2} \times h$

= $\frac{7+3}{2} \times 4$

= 5 × 4

= 20 cm²

The area of triangle ABD, shown in the diagram below, is $35\,cm^2$.
$AD = 5\,cm$ and $BC = 32\,cm$.
D is on the line AC, and BD is perpendicular to AC.

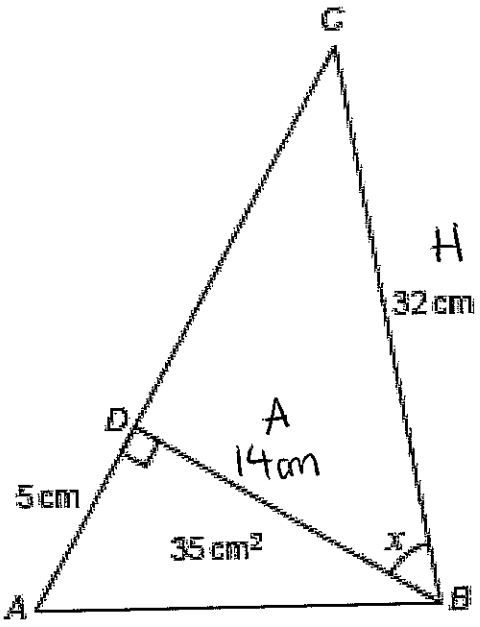


Diagram not drawn to scale

Calculate the size of angle x.
You must show all your working. [5]

$A\triangle = \frac{b \times h}{2}$

$35 = \frac{5 \times h}{2}$

$\times 2 \downarrow \times 2$

$70 = 5 \times h$

$\div 5 \downarrow \div 5$

$14\,cm = h$

SOH (CAH) TOA

$\cos\theta = \frac{A}{H}$

$\cos x = \frac{14}{32}$

$\cos^{-1} \downarrow \cos^{-1}$

$x = \cos^{-1}\left(\frac{14}{32}\right)$

$= 64.1^{\circ}$

Calculate the area of the trapezium shown below.
You must give the units of your answer. [3]

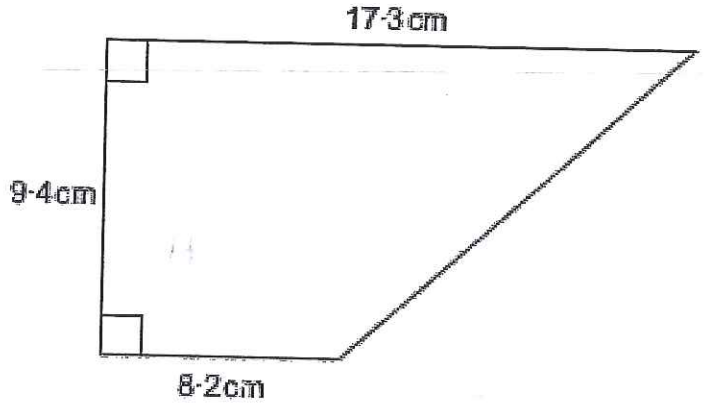


Diagram not drawn to scale

A trapezium $= \frac{(a+b) \times h}{2}$

$= \frac{8.2 + 17.3}{2} \times 9.4$

$= 12.75 \times 9.4$

$= 119.85 \text{ cm}^2$

In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.

AB is the diameter of a circle, centre *O*, with radius *OA* = 4·2 cm.
ABCD is a square.

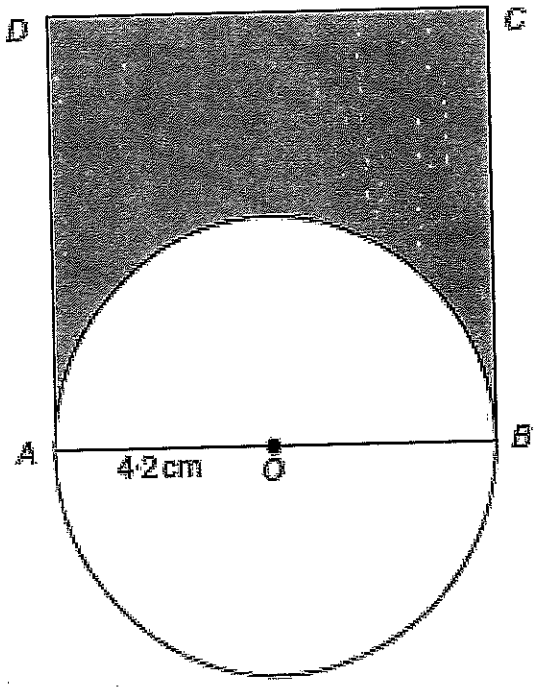


Diagram not drawn to scale

Calculate the area of the shaded region.
You must show all your working. [5 + 2 OCW]

$r = 4.2\text{ cm}$

$d = 4.2 \times 2 = 8.4\text{ cm}$

Area $\square = b \times h$
$= 8.4 \times 8.4$
$= 70.56\text{ cm}^2$

Area $\bigcirc = \pi \times r^2$
$= \pi \times 4.2^2$
$= 55.42\text{ cm}^2$

Area $\blacksquare = 70.56 - 55.42$
$= 15.14\text{ cm}^2$

A triangular prism of length 2 metres is shown below.

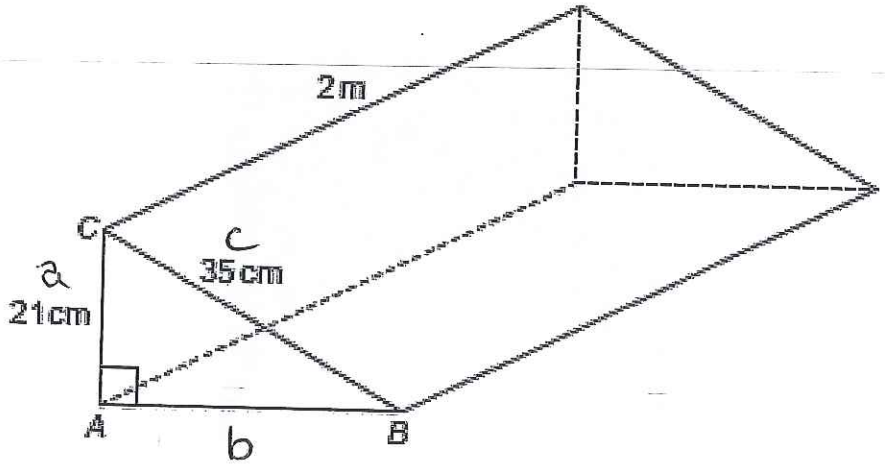


Diagram not drawn to scale

$AC = 21$ cm, $BC = 35$ cm and $B\hat{A}C = 90°$.

(a) Calculate the area of triangle ABC.
Give your answer in cm^2.
You must show all your working. [5]

$A\triangle = \frac{b \times h}{2}$

$= \frac{28 \times 21}{2}$

$= 294\ cm^2$

$c^2 - a^2 = b^2$

$35^2 - 21^2 = b^2$

$1225 - 441 = b^2$

$784 = b^2$

$\sqrt{\ } \downarrow \sqrt{\ }$

$28\ cm = b$

WJEC INTERMEDIATE TIER TRIAL AND IMPROVEMENT WORKSHEET

A solution to the equation

$$2x^3 - 3x - 17 = 0$$

lies between 2 and 3.

Use the method of trial and improvement to find this solution correct to 1 decimal place. [4]
You must show all your working.

x	$2x^3 - 3x - 17 = 0$	B/S
2.5	$2(2.5)^3 - 3(2.5) - 17 = 6.75$	B
2.4	3.448	B
2.3	0.434	B
2.2	−2.304	S
2.25	−0.96875	S

2.2 2.25 (2.3)

$x = 2.3$

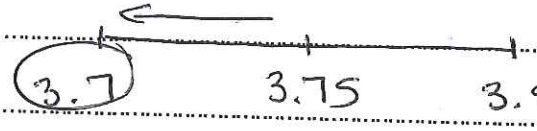
. A solution to the equation

$$x^3 - 2x - 45 = 0$$

lies between 3 and 4.

Use the method of trial and improvement to find this solution correct to 1 decimal place.
You must show all your working. [4]

x	$x^3 - 2x - 45 = 0$	B/S
3.5	$3.5^3 - 2\times3.5 - 45 = -9.125$	S
3.6	-5.544	S
3.7	-1.747	S
3.8	2.272	B
3.75	0.234	B



$x = 3.7$

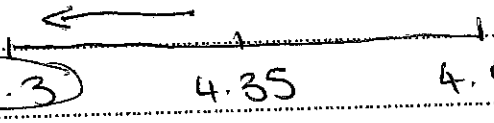
A solution of the equation

$$x^3 + 2x = 91$$

lies between 4 and 5.

Use the method of trial and improvement to find this solution correct to 1 decimal place. [4]
You must show all your working.

x	$x^3 + 2x = 91$	B/S
4.5	$4.5^3 + 2 \times 4.5 = 100.125$	B
4.4	93.984	B
4.3	88.107	S
4.35	91.013	B



$x = 4.3$

WJEC INTERMEDIATE TIER TRIGONOMETRY WORKSHEET

Calculate the length of the side QR in the triangle PQR shown below. [3]

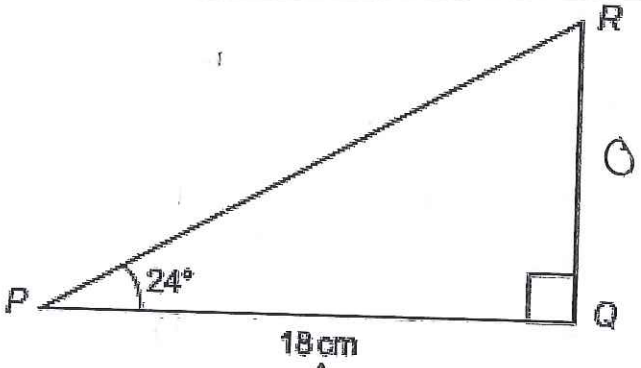


Diagram not drawn to scale

SOH CAH (TOA)

$\tan\theta = \frac{O}{A}$

$\tan 24 = \frac{O}{18}$

$\times 18 \downarrow \times 18$

$18 \times \tan 24 = O$

$8\text{ cm} = O$

The area of triangle ABD, shown in the diagram below, is 35 cm^2.
$AD = 5\text{ cm}$ and $BC = 32\text{ cm}$.
D is on the line AC, and BD is perpendicular to AC.

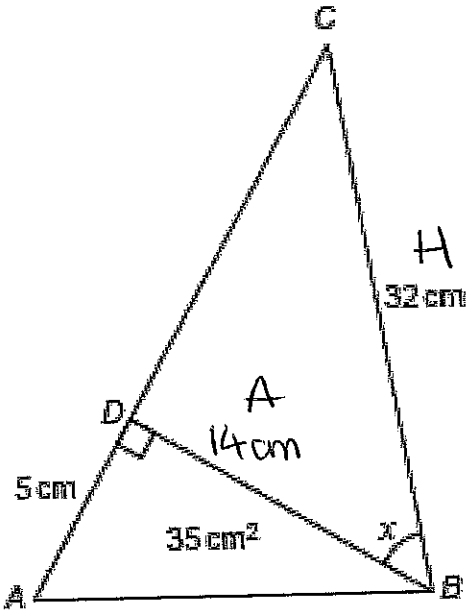


Diagram not drawn to scale

Calculate the size of angle x.
You must show all your working. [5]

$A\triangle = \frac{b \times h}{2}$

$35 = \frac{5 \times h}{2}$

$\times 2 \downarrow \times 2$

$70 = 5 \times h$

$\div 5 \downarrow \div 5$

$14\text{ cm} = h$

SOH CAH TOA

$\cos\theta = \frac{A}{H}$

$\cos x = \frac{14}{32}$

$\cos^{-1} \downarrow \cos^{-1}$

$x = \cos^{-1}\left(\frac{14}{32}\right)$

$x = 64°$

The diagram shows two right-angled triangles, joined together along a common side.

$S\hat{P}Q = 90°$, $S\hat{Q}R = 90°$, $S\hat{Q}P = 38°$, $PS = 8\,cm$ and $QR = 15\,cm$.

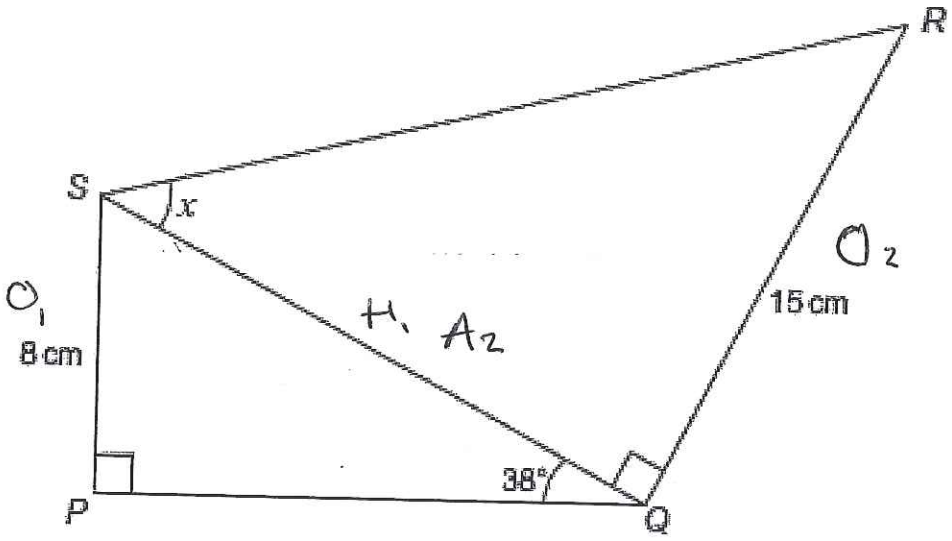


Diagram not drawn to scale

Calculate the size of angle x. [6]

① SOH CAH TOA ② SOH CAH TOA

$\sin\theta = \frac{O}{H}$

$\sin 38 = \frac{8}{H}$

$\times H \downarrow \times H$

$H \times \sin 38 = 8$

$\div \sin 38 \downarrow \div \sin 38$

$H = \frac{8}{\sin 38}$

$H = 13\,cm$

$\tan\theta = \frac{O}{A}$

$\tan x = \frac{15}{13}$

$\tan^{-1} \downarrow \tan^{-1}$

$x = \tan^{-1}\left(\frac{15}{13}\right)$

$= 49°$

Calculate each of the following.

(a) $0{\cdot}4 \times 0{\cdot}7$ [1]

0.28

(b) $13{\cdot}8 - 7{\cdot}45$ [1]

$$\begin{array}{r} {}^{0}\cancel{1}{}^{1}3.{}^{7}\cancel{8}{}^{1}0 \\ -\ 7.45 \\ \hline 6.35 \end{array}$$

(c) $3^3 - 2^4$ [2]

$3^3 = 3 \times 3 \times 3 = 27$ $\quad 27 - 16 = 21$

$2^4 = 2 \times 2 \times 2 \times 2 = 16$

(d) $\frac{9}{10} - \frac{3}{5}$ [2]

$\frac{9}{10} - \frac{3}{5} = \frac{45 - 30}{50} = \frac{15}{50} = \frac{3}{10}$

Calculate each of the following.

(a) $3^4 \times 10^3$ [2]

$3^4 = 3 \times 3 \times 3 \times 3 = 81$ $1000 \times 81 = 81000$

$10^3 = 10 \times 10 \times 10 = 1000$

(b) $\frac{1}{0.5}$ [1]

2

(c) $5.6 - 3.82$ [1]

$$\begin{array}{r} {}^{4}\cancel{5}.{}^{15}\cancel{6}{}^{1}0 \\ -\ 3.82 \\ \hline 1.78 \end{array}$$

(d) $\frac{5}{6} - \frac{2}{3}$ [2]

$\frac{5}{6} - \frac{2}{3} = \frac{15-12}{18} = \frac{3}{18} = \frac{1}{6}$

6×3

(e) 0.2×0.3 [1]

0.06

(a) Calculate 39% of £576. [2]

39% = 39/100 = 0.39

0.39 x 576 = £224.64

(b) Calculate $\frac{3}{7}$ of 100.

Give your answer correct to the nearest whole number. [2]

3/7 of 100 = 100/7 x 3 = 42.857...

= 43

(c) How many quarters are there in 10? [1]

10 = 40

0.25

(d) What fraction is equal to 50% of $\frac{1}{6}$? [1]

50% = 1/2 1/2 x 1/6 = 1/12

(e) Circle the fraction that is a recurring decimal. [1]

$\frac{21}{35}$ $\frac{10}{12}$ $\frac{17}{68}$ $\frac{15}{24}$ $\frac{51}{170}$

21 ÷ 35 = 3/5 = 0.6

10 ÷ 12 = 5/6 = $0.8\dot{3}$

WJEC INTERMEDIATE TIER SIMPLIFYING WORKSHEET

(a) Write down the next two numbers in the following sequence. [2]

$33 \xrightarrow{-7} 26 \xrightarrow{-7} 19 \xrightarrow{-7} 12 \xrightarrow{-7} 5 \xrightarrow{-7} -2$

(b) Simplify the expression $10g - 5f - 3g + 3f$. [2]

$7g - 2f$

(c) Using the formula $2T = M + 3K$, find the value of K when $T = 11$ and $M = 4$. [2]

$2 \times 11 = 4 + 3K$

$22 = 4 + 3K$

$-4 \quad -4$

$18 = 3K$

$\div 3 \quad \div 3$

$6 = K$

(a) Write down the next two numbers in the following sequence. [2]

$35, \xrightarrow{-10} 25, \xrightarrow{-9} 16, \xrightarrow{-8} 8, \xrightarrow{-7} 1, \xrightarrow{-6} -5$

(b) Find the value of $2x + 7y$ when $x = -3$ and $y = 10$. [2]

$2 \times -3 + 7 \times 10$

$= -6 + 70$

$= 64$

(c) Simplify the expression $8k + 3m - 2k - 8m$. [2]

$6k - 5m$

Circle the correct answer for each of the following.

(a) $x^3 \times x^6 =$ $x^{3+6} = x^9$ [1]

x^{36} $x^{0.5}$ x^2 x^9 x^{18}

(b) $(7x - 5y) - (3x + 2y) =$ $7x - 5y - 3x - 2y$ [1]

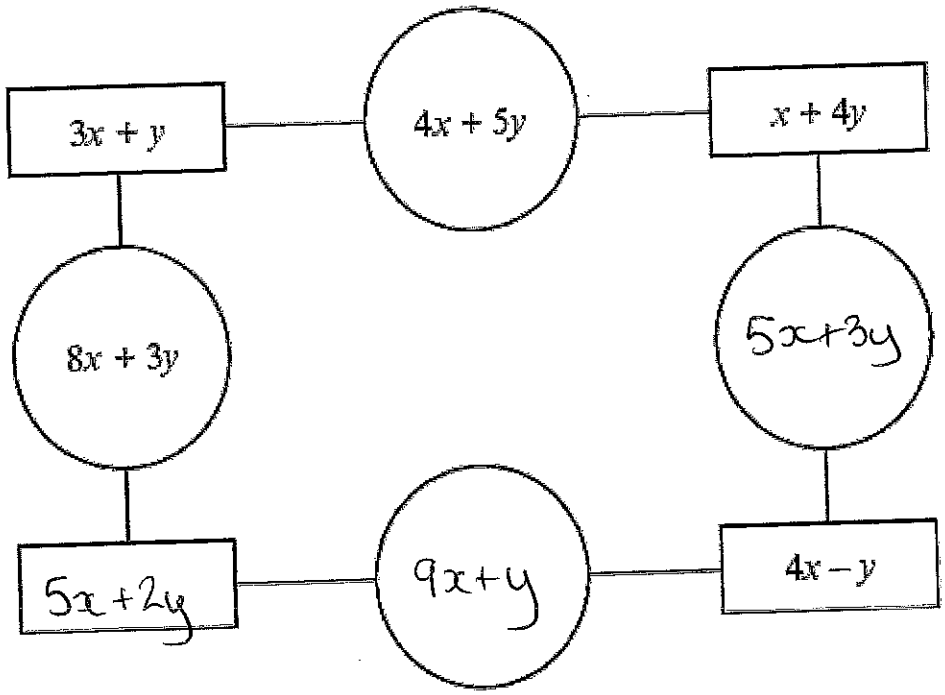
$4x - 3y$ $4x - 7y$ $4x + 3y$ $-4x + 7y$ $-4x - 7y$

(c) A car travels x miles in 30 minutes.
Its average speed in miles per hour is [1]

$\frac{x}{2}$ $\frac{x}{30}$ $2x$ $\frac{2}{x}$ $30x$

$S = \frac{d}{t} = \frac{x}{0.5} = 2x$

Look at the diagram below.
The expression in each circle is found by adding the expressions in the rectangles on either side of the circle.
Complete the diagram by writing expressions in the blank circles and the blank rectangle.
You must simplify your expressions. [3]



Working space:

A regular polygon has exterior angles of 45°.

(a) How many sides does this polygon have? [2]

$\frac{360}{45} = 8$

(b) Each side of this regular polygon is 7 cm.
A sketch of two sides, *AB* and *BC*, of the polygon is shown below.

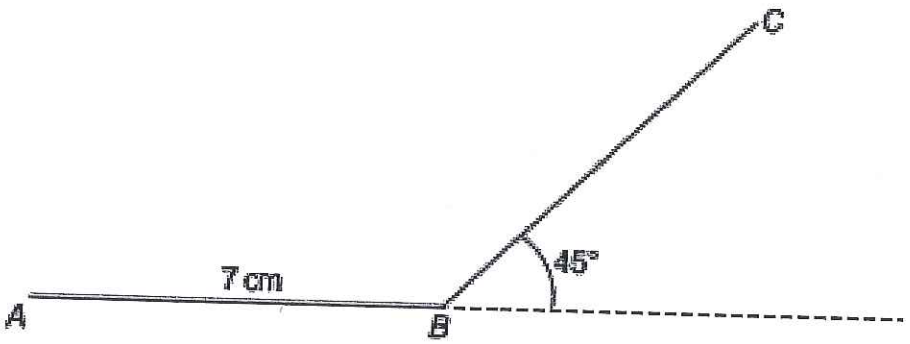
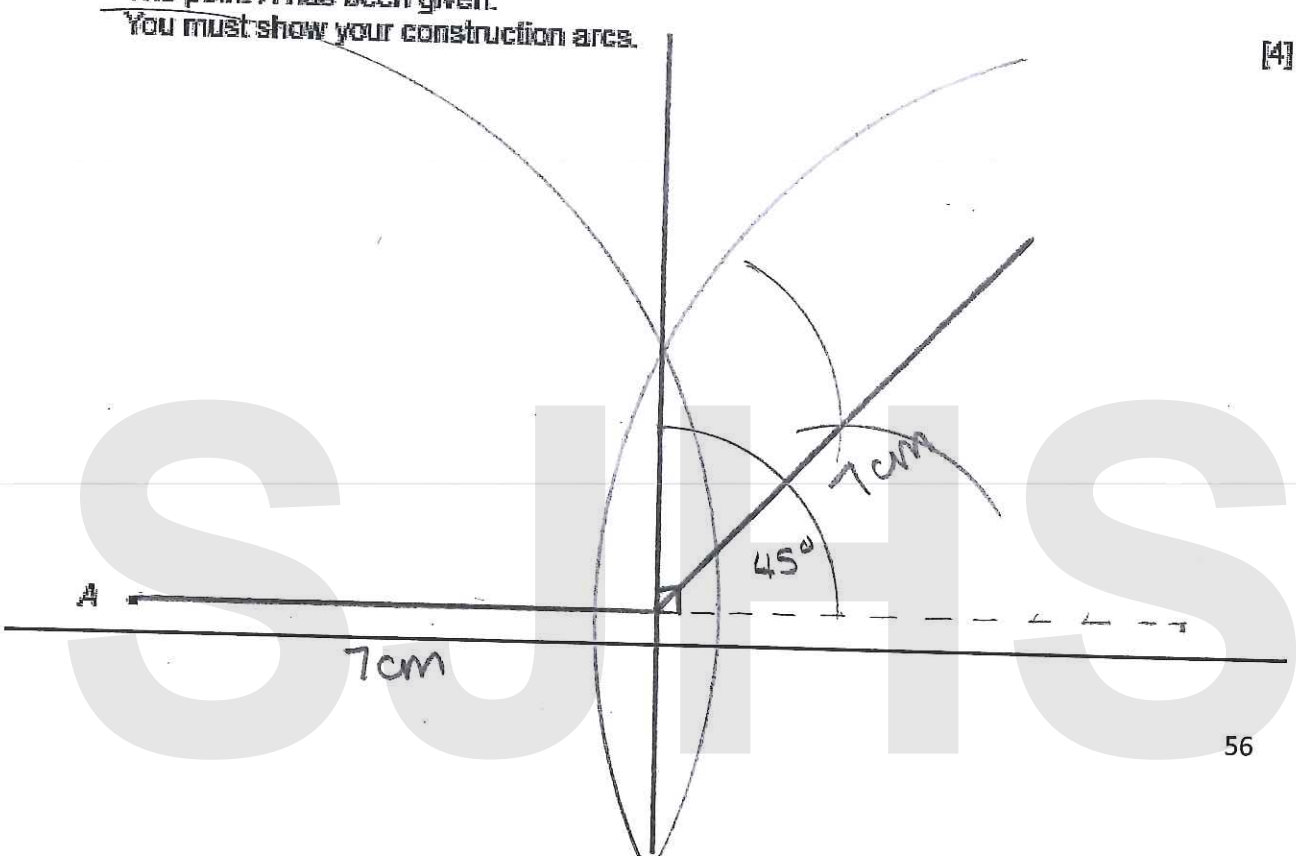
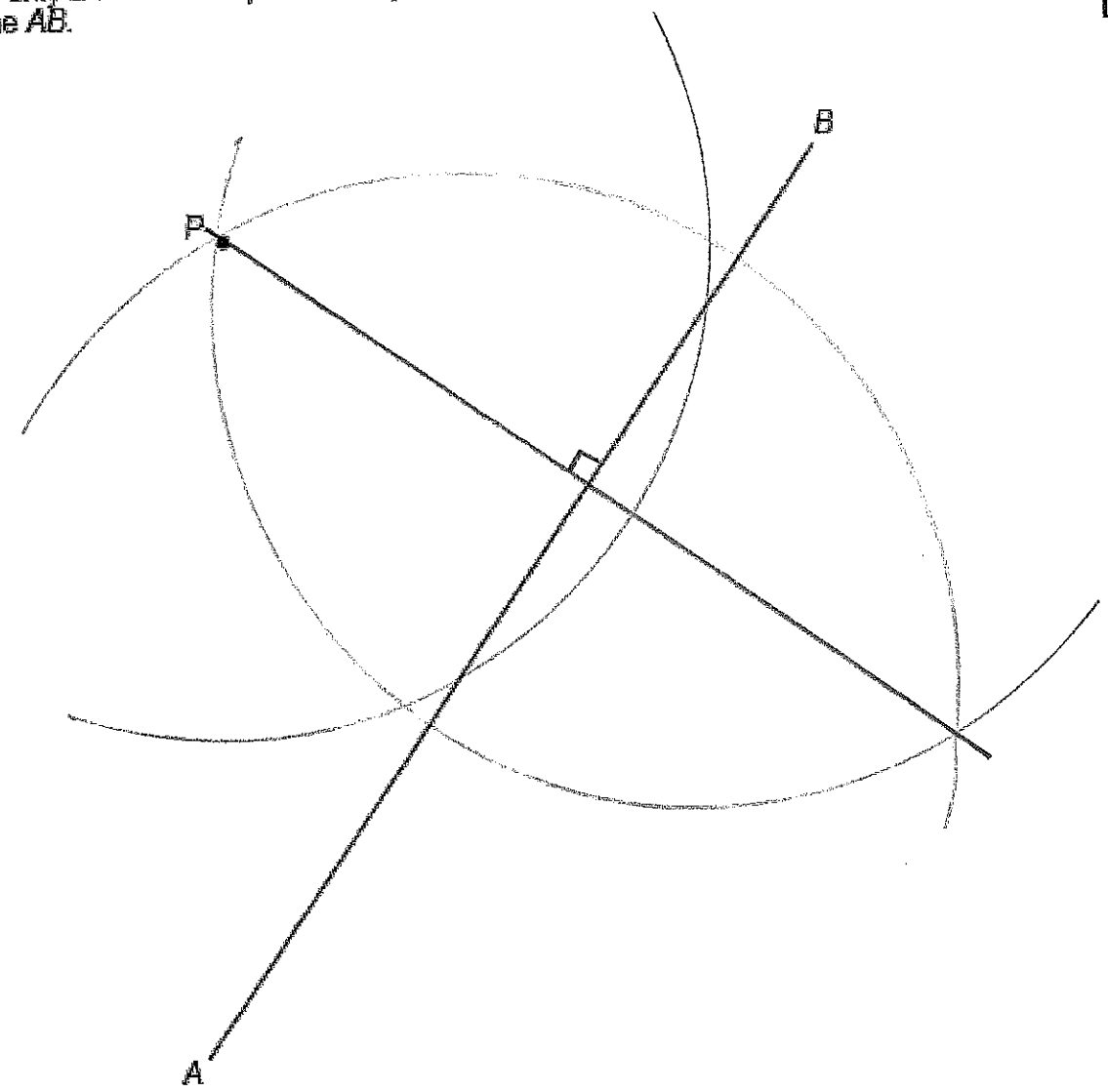


Diagram not drawn to scale

Using only a ruler and a pair of compasses, construct an accurate drawing that shows these two sides of the polygon.
The point *A* has been given.
You must show your construction arcs. [4]

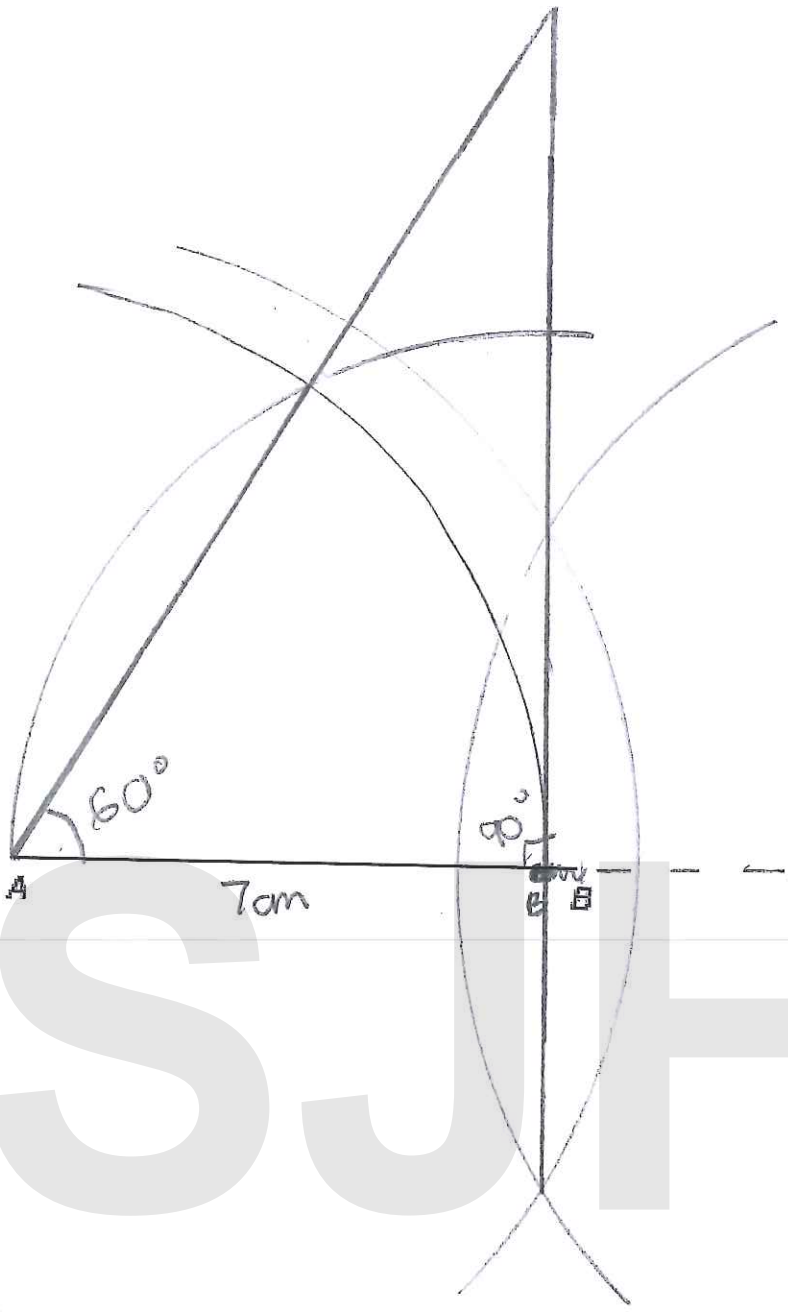


Using only a ruler and a pair of compasses, construct a perpendicular line from the point P to the line AB. [3]



Construct an accurate drawing of triangle ABC, where $AB = 7$ cm, $A\hat{B}C = 90°$ and $B\hat{A}C = 60°$.
Use only a ruler and a pair of compasses.
The side AB has been drawn for you.
You must show your construction arcs.

[3]



WJEC INTERMEDIATE TIER FACTORISING WORKSHEET

(a) Make m the subject of the formula $y = 6m + 7$. [2]

$-7 \downarrow -7$

$y - 7 = 6m$

$\div 6 \downarrow \div 6$

$\frac{y-7}{6} = m$

(b) Factorise $6x^2 - 12x$. [2]

$6x(x - 2)$

Factorise $x^2 - 7x - 18$, and hence solve $x^2 - 7x - 18 = 0$. [3]

$s = -7$

$p = -18$

$1, 18$

$2, -9$

$(x+2)(x-9) = 0$

$x = -2$ or $x = 9$

(a) Factorise $x^2 - 2x - 24$, and hence solve $x^2 - 2x - 24 = 0$. [3]

$s = -2$

$p = -24$

1, 24

2, 12

3, 8

(4, -6)

$(x+4)(x-6) = 0$

$x = -4$ or $x = 6$

(b) Solve the equation $\frac{4x-3}{2} + \frac{7x+1}{6} = \frac{29}{2}$. [4]

$\times 2 \times 6 \times 2$ $\quad \times 2 \times 6 \times 2$ $\quad \times 2 \times 6 \times 2$

$12(4x-3) + 4(7x+1) = 12(29)$

$48x - 36 + 28x + 4 = 348$

$76x - 32 = 348$

$+32 \downarrow +32$

$76x = 380$

$\div 76 \downarrow \div 76$

$x = 5$

(a) Factorise $x^3 - 5x$. [1]

$x(x^2 - 5)$

(b) Expand and simplify $(2x - 3)(x + 4)$. [2]

F = $2x \times x = 2x^2$ $2x^2 + 5x - 12$

O = $2x \times 4 = 8x$

I = $-3 \times x = -3x$

L = $-3 \times 4 = -12$

(c) Factorise $x^2 - 3x - 28$. [2]

$s = -3$ $(x+4)(x-7)$

$p = -28$

1, 28

2, 14

4, -7

William has n marbles.
Lois had 4 times as many marbles as William, but she has now lost 23 of them.

Lois still has more marbles than William.

Write down an inequality in terms of n to show the above information.
Use your inequality to find the least number of marbles that William may have. [4]

William : n

Lois : $4n - 23$

$4n - 23 > n$

$-n \downarrow -n$

$3n - 23 > 0$

$+23 \downarrow +23$

$3n > 23$

$\div 3 \downarrow \div 3$

$n > 7.6$

William has at least 8 marbles.

Rashid owned n sheep.
Eifion had exactly 4 times as many sheep as Rashid.

Rashid buys 17 extra sheep.
Eifion sells 8 of his sheep.

Eifion still has more sheep than Rashid.

Form an inequality, in terms of n.
Solve the inequality to find the least value of n.
You must show all your working. [5]

Rashid : $n + 17$

Eifion : $4n - 8$

$4n - 8 > n + 17$

$-n \quad -n$

$3n - 8 > 17$

$+8 \quad +8$

$3n > 25$

$\div 3 \quad \div 3$

$n > 8.\dot{3}$

least value of n is 9.

A shop has 31 plant pots.
Some are blue, some are yellow and the rest are red.
There are five more blue pots than yellow pots.
There are four times as many blue pots as there are red pots.

Calculate how many pots there are of each colour. [3]

$B + Y + R = 31$

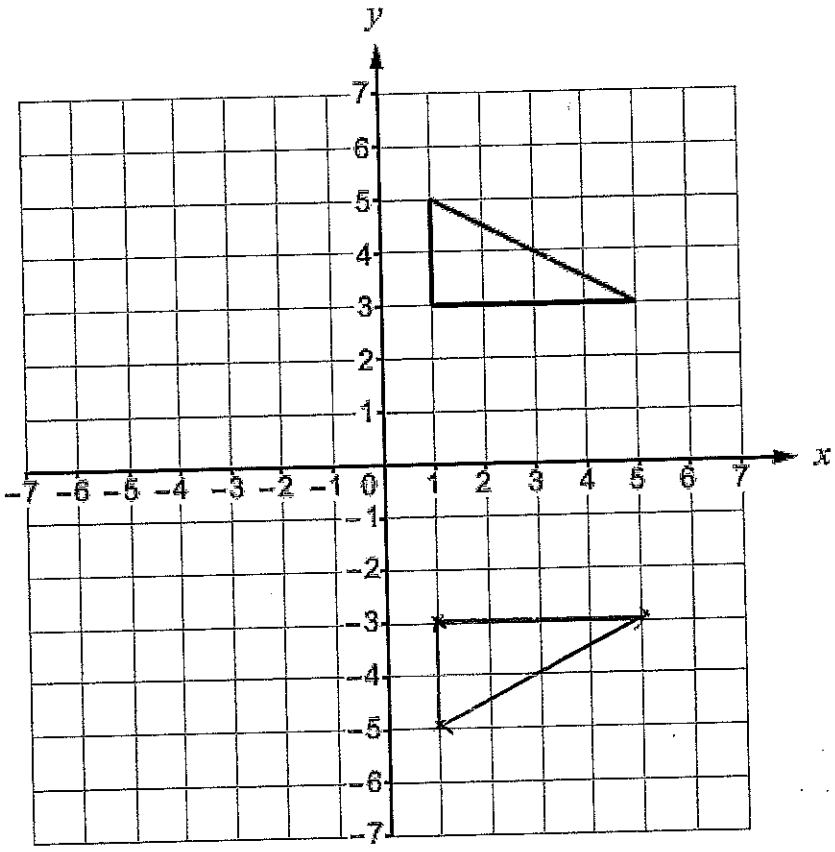
$B = Y + 5$

$B = 4R$

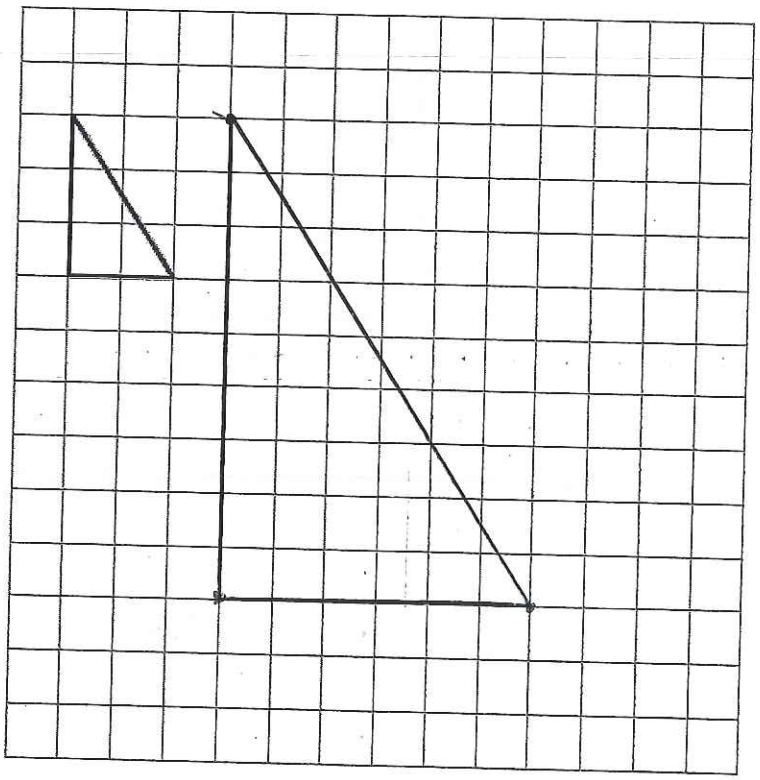
Red $= 4$ Blue $= 4 \times 4 = 16$ Yellow $= 16 - 5 = 11$

Blue 16 Yellow 11 Red 4

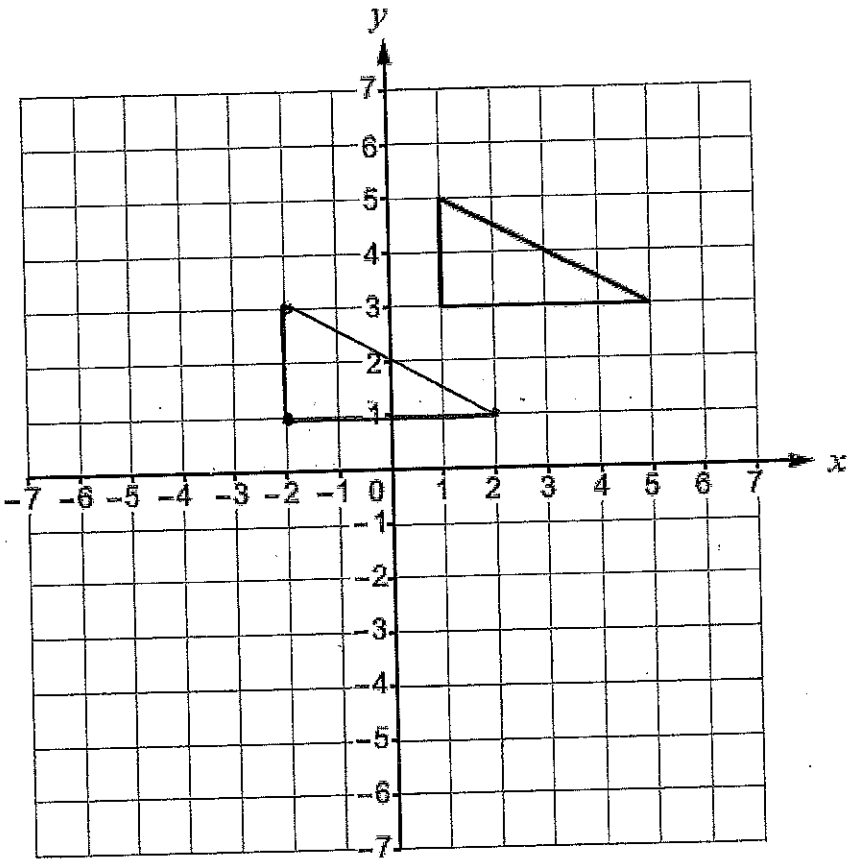
(a) Reflect the triangle below in the x-axis. [1]



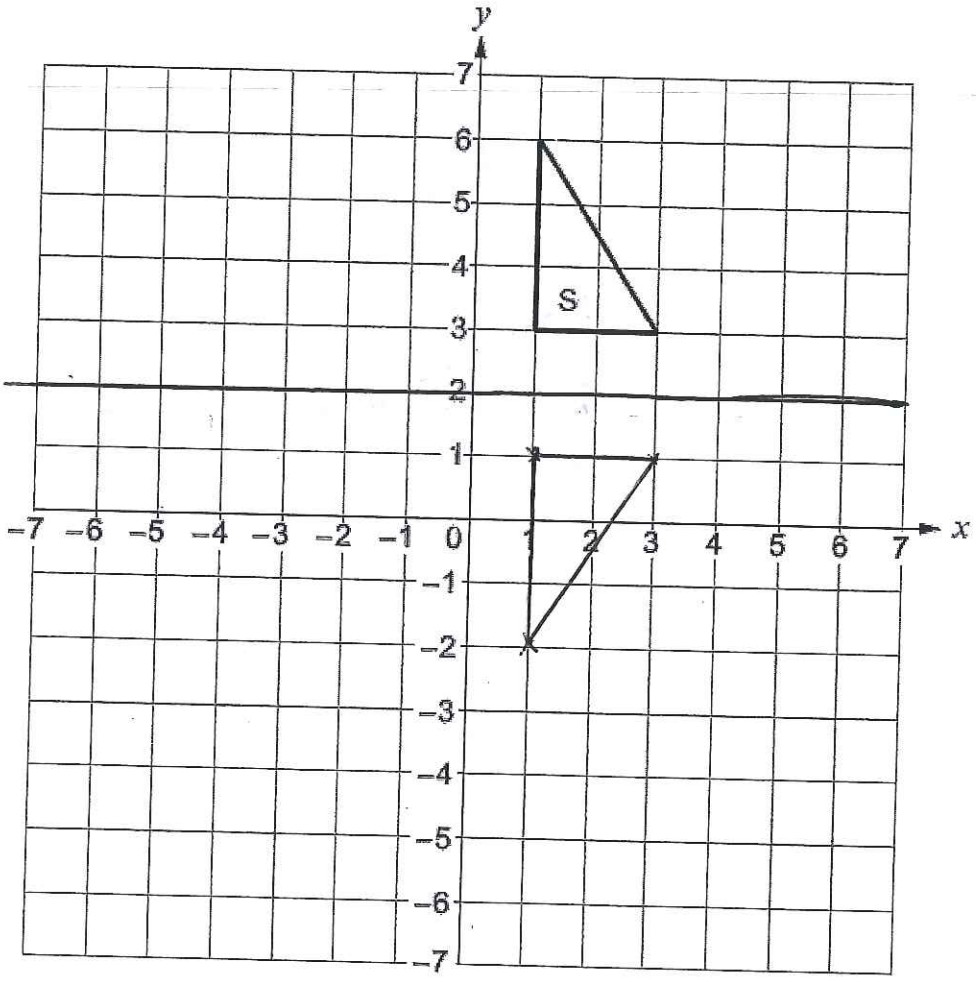
(b) Enlarge the triangle below by a scale factor of 3. [2]



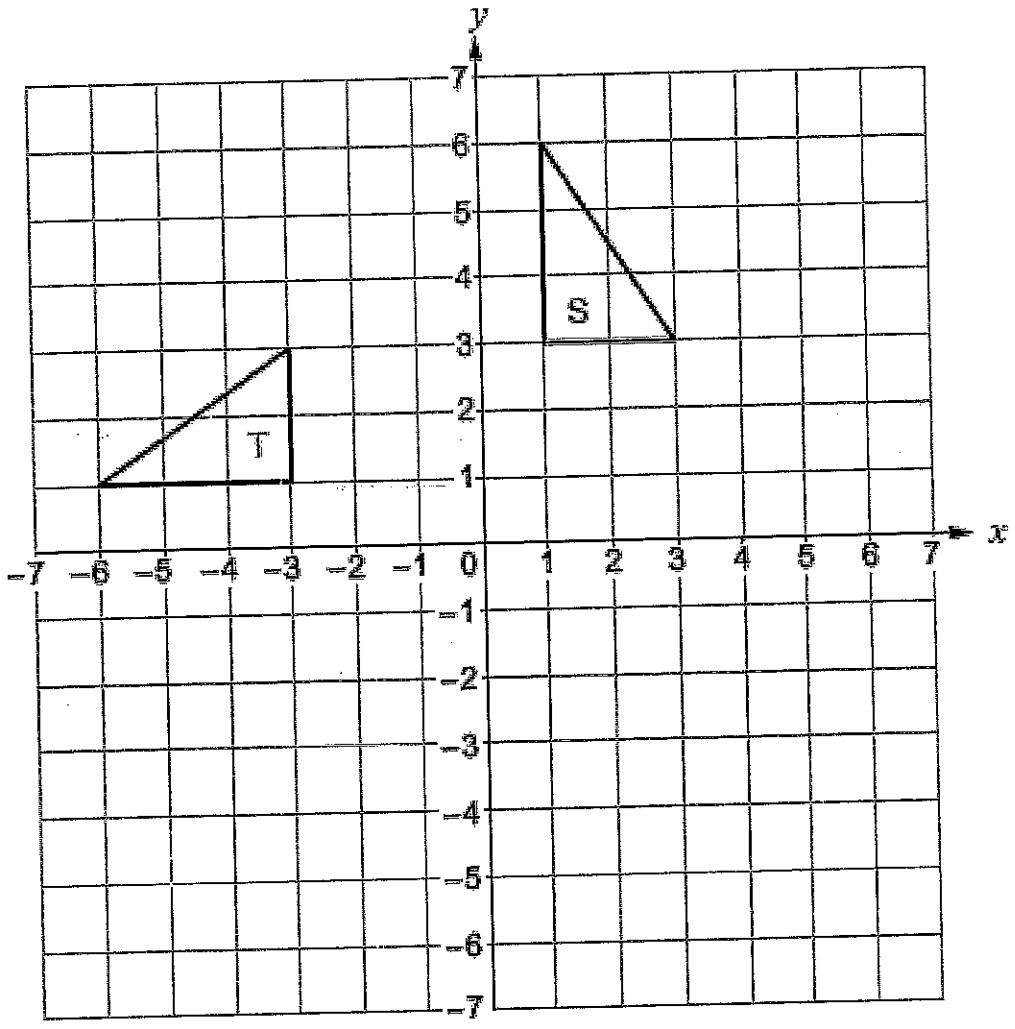
(c) Translate the triangle below 3 squares to the left and 2 squares down. [1]



(a) Reflect the triangle S in the line $y = 2$. [2]

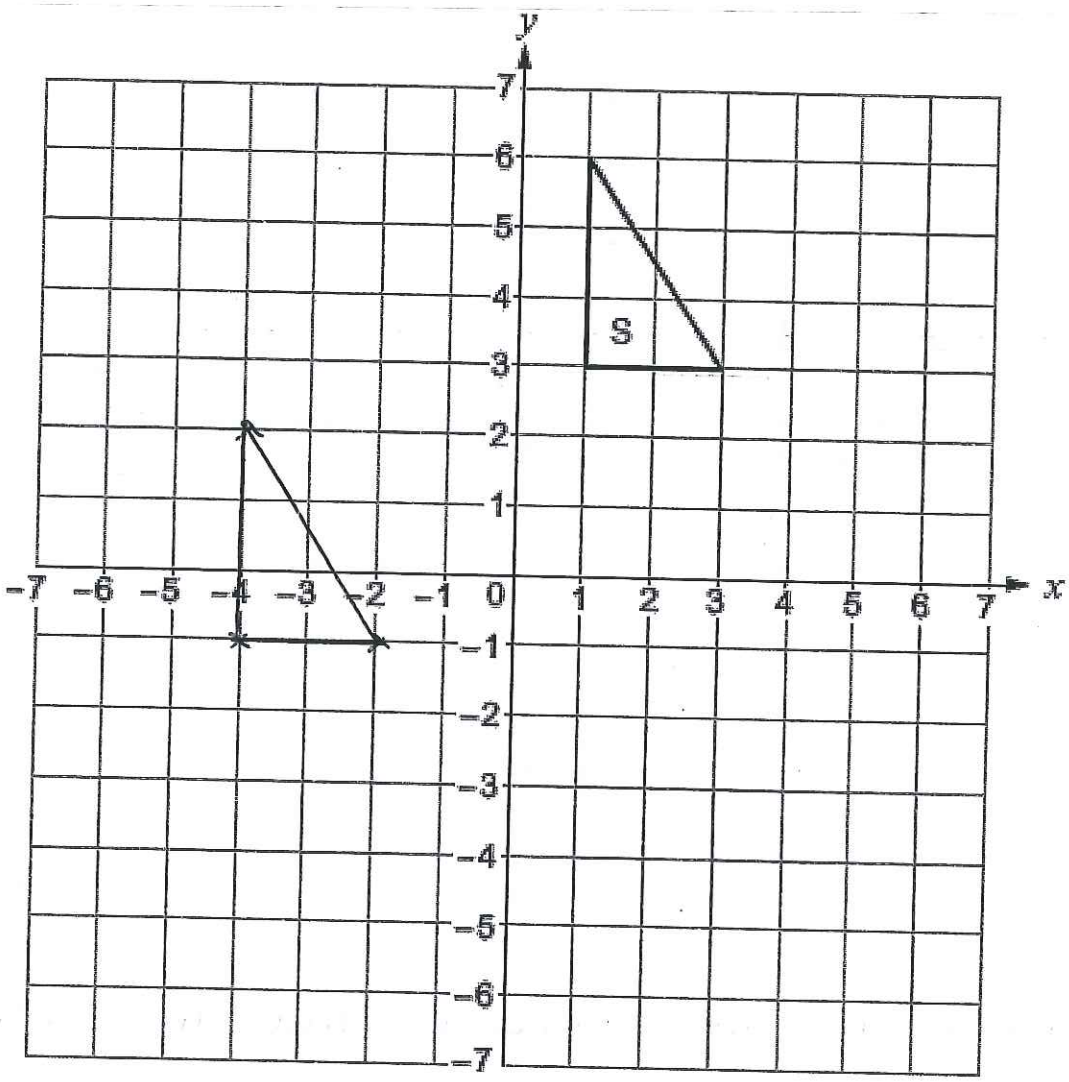


(b) Describe fully a single transformation that transforms triangle S onto triangle T. [3]



Rotation 90° anti-clockwise about the origin

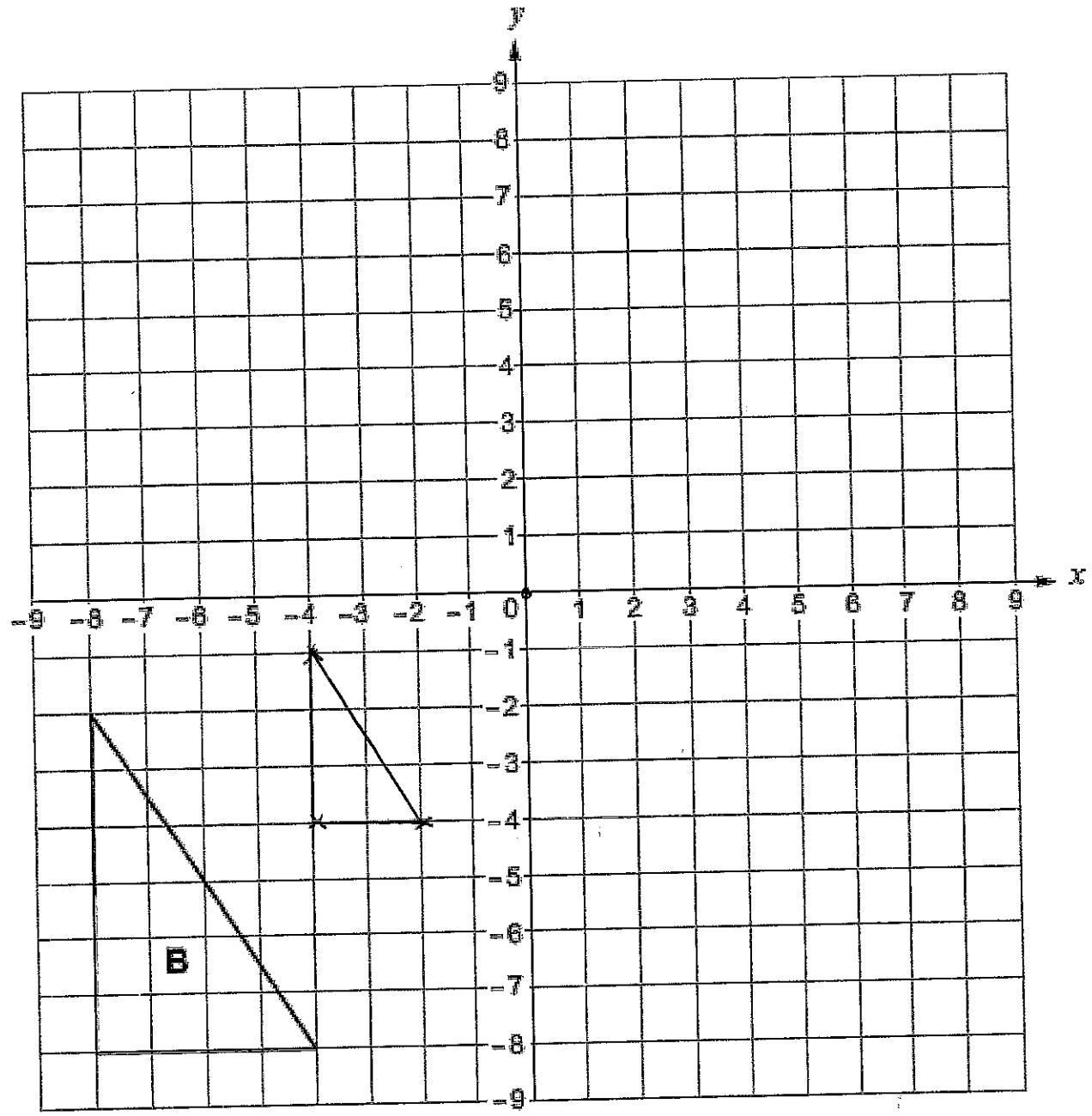
(c) (i) Translate the triangle S using the column vector $\begin{pmatrix} -5 \\ -4 \end{pmatrix}$. [1]



(ii) Write down the column vector that will reverse the translation in part (i). [1]

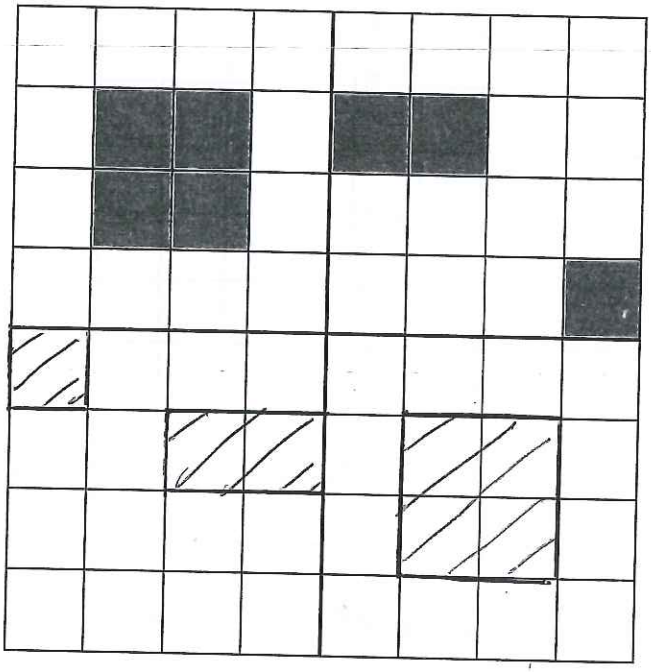
$\begin{pmatrix} 5 \\ 4 \end{pmatrix}$

(b) Enlarge triangle B by a scale factor of $\frac{1}{2}$, using (0, 0) as the centre of enlargement. [2]



Shade the least number of squares in the lower two quadrants so that the grid has rotational symmetry of order 2.

[3]

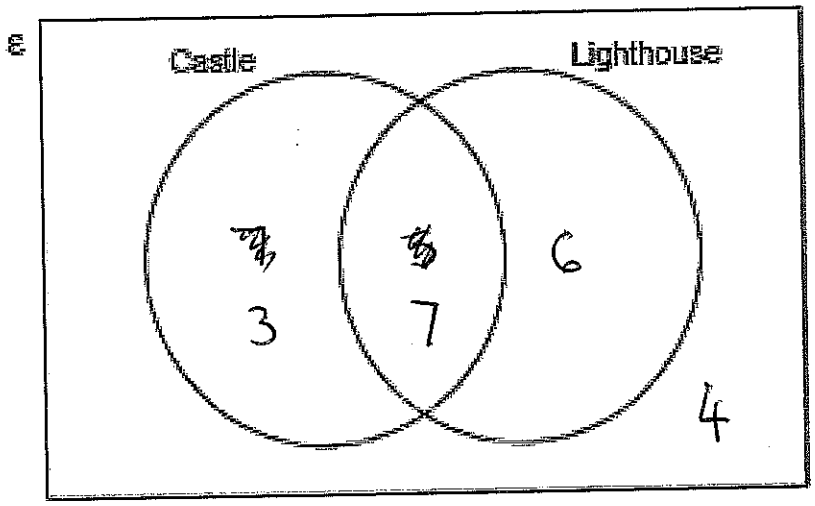


WJEC INTERMEDIATE TIER VENN DIAGRAMS WORKSHEET

A group of 20 people visited Anglesey for a weekend break.

- 10 of the group visited Beaumaris Castle.
- 13 of the group visited South Stack Lighthouse.
- 4 of the group did not visit either of these places.

(a) Complete the Venn diagram below to show this information.
The universal set, ε, contains all of the 20 people in the group. [3]



~~10+13=23~~ 23-20=3

20-4=16 10+13=23 23-16=7

~~10-3=7~~ 13-3=10

10-7=3 13-7=6

(b) One person is chosen at random from the group.
What is the probability that this person visited only one of the two places? [2]

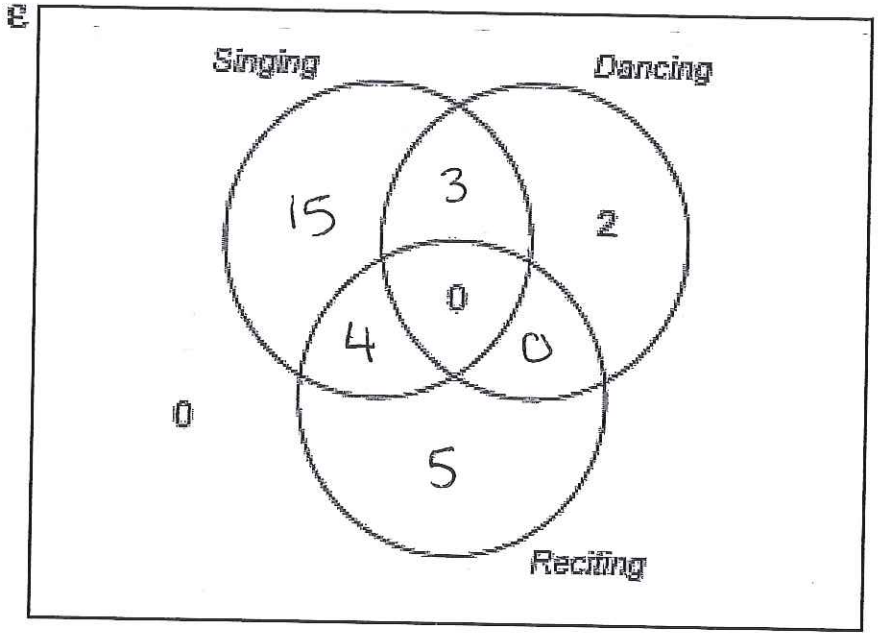
$\frac{3+6}{20} = \frac{9}{20}$

A group of pupils from a school took part in The Urdd National Eisteddfod.
All of them competed in at least one of the following competitions: *Singing*, *Dancing* or *Reciting*.

- 2 of them only took part in a *Dancing* competition.
- 5 only took part in a *Reciting* competition.
- No one took part in both a *Reciting* and a *Dancing* competition.
- 3 took part in both a *Singing* and a *Dancing* competition.
- 9 took part in a *Reciting* competition.
- 22 took part in a *Singing* competition.

The Venn diagram below shows some of the above information.
The universal set, $\mathcal{E}$, contains all of the pupils in the group.

One of the pupils in the group is chosen at random.
What is the probability that this person only took part in a *Singing* competition? [5]

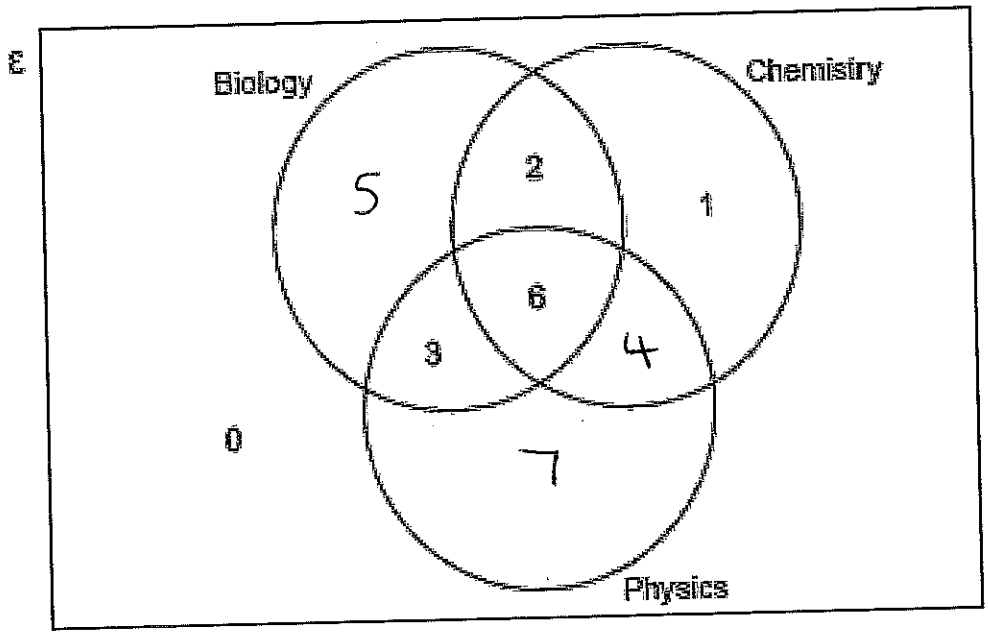


At a college, a total of 28 students study one or more of the science subjects: Biology, Chemistry and Physics.
The 28 students form the universal set, ℰ.
Some parts of the Venn diagram below have already been completed.

It is also known that:

- 5 students study only Biology
- 13 students study Chemistry

(a) Complete the Venn diagram. [3]



$6+2+1=9 \quad 13-9=4$

$5+2+6+3+1+4=21 \quad 28-21=7$

(b) How many students study Biology and Chemistry but not Physics? [1]

2

(c) One of the students is chosen at random.
What is the probability that this student studies Biology? [2]

$\frac{5+2+6+3}{28} = \frac{16}{28}$

(a) Solve the equation $3x - 2 \equiv 10$. [2]

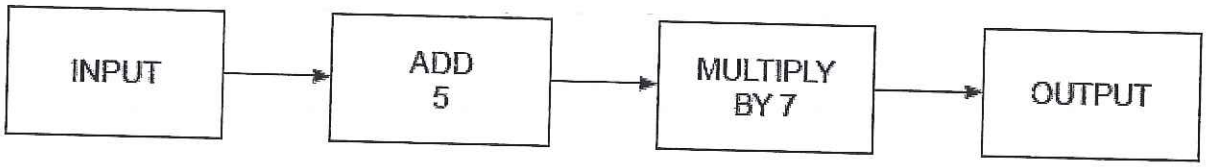
$+2 \downarrow +2$

$3x = 12$

$\div 3 \downarrow \div 3$

$x = 4$

(b) A number machine is shown below.



(i) Calculate the OUTPUT when the INPUT is –2. [1]

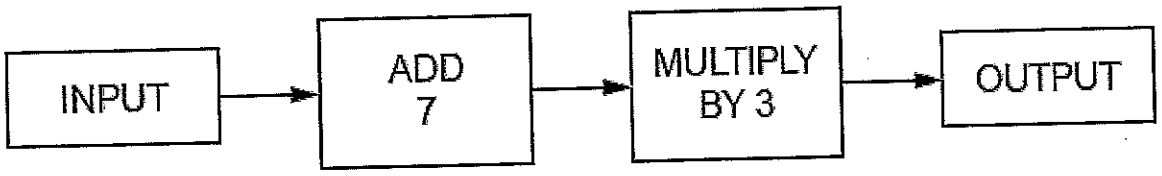
$-2+5 = 3$

$3 \times 7 = 21$

(ii) Write down an expression for the OUTPUT when the INPUT is n. [2]

$7(n+5)$

The diagram below shows a number machine.



Using the number machine, calculate:

(a) the INPUT when the OUTPUT is 36, [1]

$36 \div 3 = 12$

$12 - 7 = 5$

(b) the OUTPUT when the INPUT is n. [2]

$3(n+7)$

WJEC INTERMEDIATE TIER INDEX LAWS WORKSHEET

Circle the correct answer for each of the following.

(a) $x^3 \times x^6 =$ $x^{3+6} = x^9$ [1]

x^{36} $x^{0.5}$ x^2 x^9 x^{18}

(b) $(7x - 5y) - (3x + 2y) =$ $7x - 5y - 3x - 2y$ [1]

$4x - 3y$ $4x - 7y$ $4x + 3y$ $-4x + 7y$ $-4x - 7y$

(c) A car travels x miles in 30 minutes.
Its average speed in miles per hour is [1]

$\frac{x}{2}$ $\frac{x}{30}$ $2x$ $\frac{2}{x}$ $30x$

$s = d = x = 2x$
$t \quad 0.5$

Simplify each of the following and circle the correct answer in each case.

(a) $6p^6 \times 3p^3 = 18p^{6+3} = 18p^9$ [1]

$9p^9$ $9p^{18}$ $18p^{18}$ $18p^2$ $18p^9$

(b) $3.4g^8 \div 13.6g^2$ $\frac{3.4}{13.6} g^{8-2} = \frac{g^6}{4}$ [1]

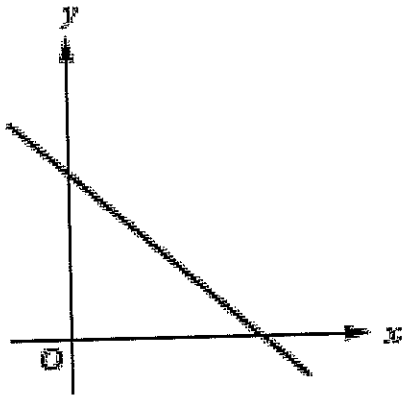
$\frac{g^4}{4}$ $\frac{g^6}{4}$ $4g^4$ $4g^6$ $0.4g^6$

(c) $\frac{m^3 \times m^6}{m^9} = \frac{m^{3+6}}{m^9} = \frac{m^9}{m^9} = m^{9-9} = m^0 = 1$ [1]

1 m m^2 m^4 4

WJEC INTERMEDIATE TIER STRAIGHT LINE GRAPHS WORKSHEET

(a)



Which one of the following equations could represent the line shown in the graph above? [1]
Circle your answer.

$y = -x - 2$ $y = -x + 2$ $y = x + 2$ $y = x - 2$ $y = -x$.

(b) Which one of the following points lies on the line $2y = 3x + 4$? [1]
Circle your answer.

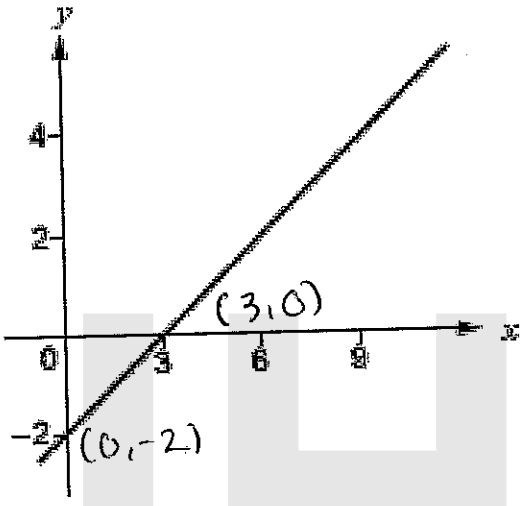
~~(2, 8)~~ (5, 2) (–2, 5) (2, 5) (–2, –5)

$2(-5) = 3(2) + 4$ $2(5) = 3(2) + 4$

$-10 = 6 + 4$ $10 = 6 + 4$

$-10 \neq 10$ $10 = 10$ ✓

(c)



What is the gradient of the line shown in the graph above? [1]
Circle your answer.

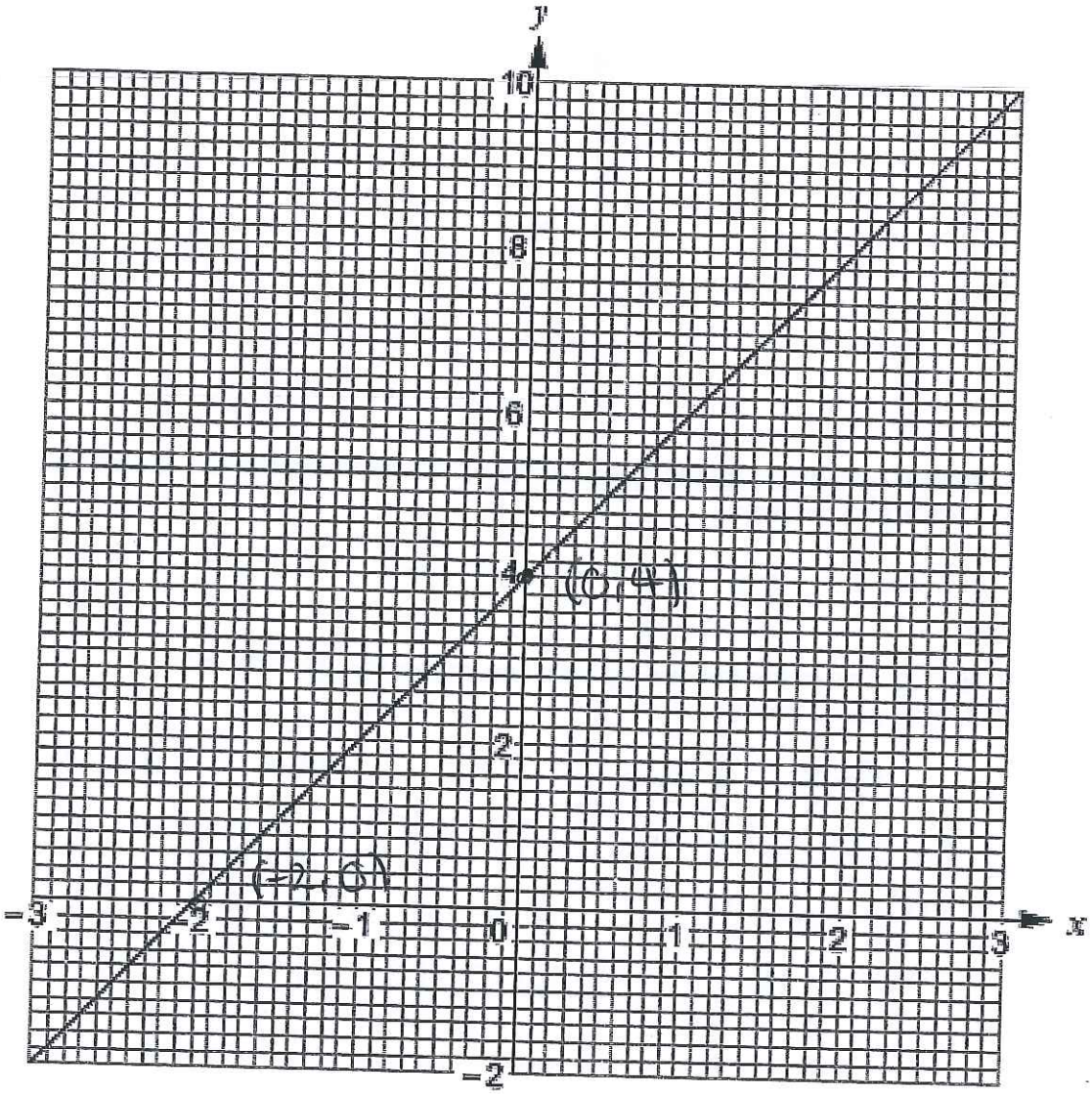
$\frac{3}{2}$ $-\frac{3}{2}$ $\frac{2}{3}$ $-\frac{2}{3}$

$m = \frac{y_1 - y_0}{x_1 - x_0}$

$= \frac{0 - -2}{3 - 0}$

$= \frac{2}{3}$

(a) The diagram below shows the graph of a straight line for values of x from -3 to 3.



(i) Write down the gradient of the above line.

$m = \frac{y_1 - y_0}{x_1 - x_0} = \frac{4 - 0}{0 - -2} = \frac{4}{2} = 2$

(ii) Write down the equation of the line in the form $y = mx + c$, where m and c are wh numbers.

$y = 2x + 4$

(b) Without drawing, show that the line $2y = 5x - 3$ is parallel to the line $4y = 10x + 7$. You must show working to support your answer.

$2y = 5x - 3 \xrightarrow{\times 2} 4y = 10x - 6$

$4y = 10x + 7 \quad 4y = 10x + 7$

gradient the same

so parallel.

19. *(a)* Circle the equation of a straight line that is parallel to the line $3y = 2x + 6$. [1]

$3y = 2x + 7$ $\quad 2y = 3x + 6$ $\quad 3y = -2x + 6$ $\quad -3y = 2x + 6$ $\quad 2y = -3x + 6$

(b) Circle the equation of a straight line that is perpendicular to the line $y = 5x - 3$. [1]

$y = \frac{x}{5} + 3$ $\quad y = 5x + 3$ $\quad y = 5x + \frac{1}{3}$ $\quad y = -5x + 3$ $\quad y = \frac{-x}{5} + 3$

perpendicular when $m_1 \times m_2 = -1$

$\frac{1}{5} \times 5 = 1$

$5 \times 5 = 25$

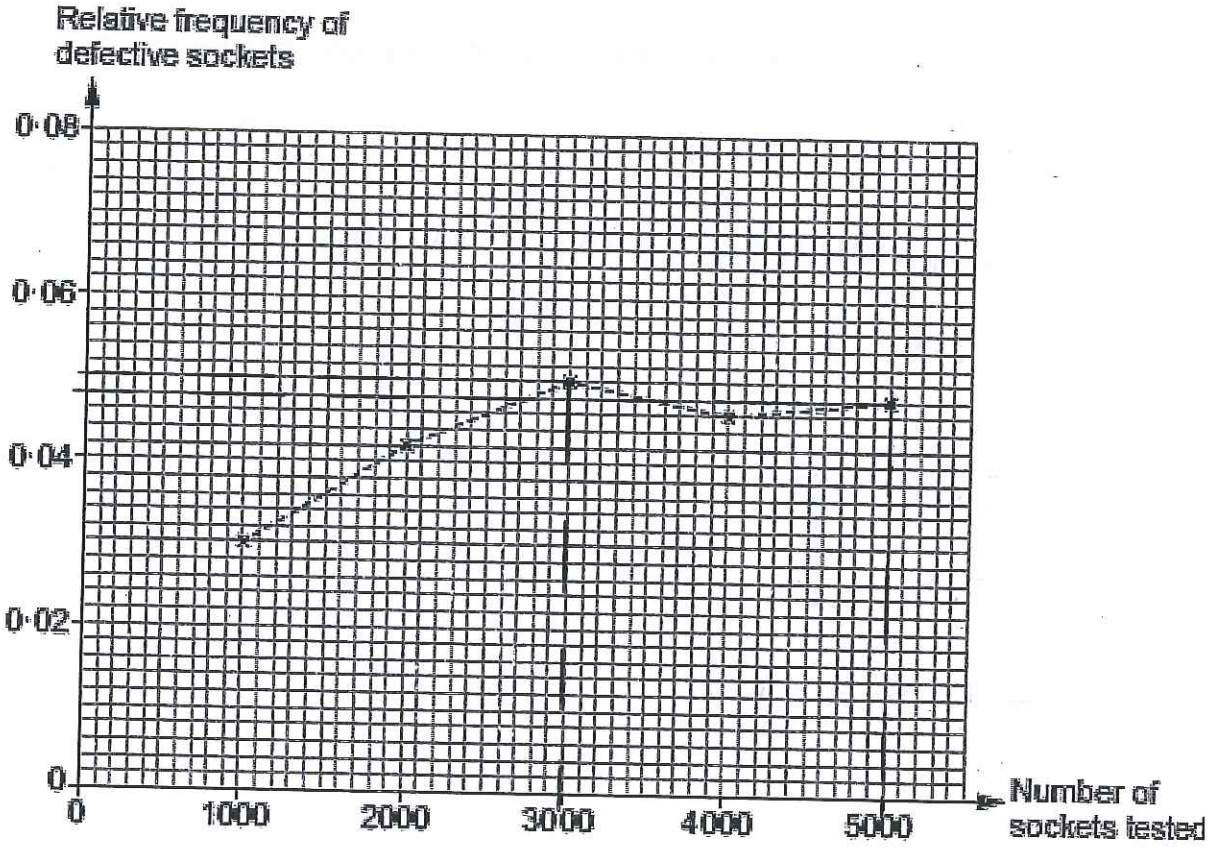
$-5 \times 5 = -25$

$-\frac{1}{5} \times 5 = -1$

WJEC INTERMEDIATE TIER RELATIVE FREQUENCY WORKSHEET

A factory uses a machine to produce electrical sockets.
The manager carries out a survey to investigate the probability of the machine producing defective socket.

The relative frequency of defective sockets produced was calculated after testing a total of 100 2000, 3000, 4000 and 5000 sockets.
The results are plotted on the graph below.



(a) How many of the first 3000 sockets tested were defective? [2

0.05 x 3000 = 150

(b) Write down the best estimate for the probability that one socket, selected at random, wi be defective.
You must give a reason for your choice. [2

Probability: 0.048

Reason: More trials give more accuracy

A dice is thrown 50 times.
The number shown on the dice is recorded after each throw.
The table below shows the results recorded.

Number shown on dice	1	2	3	4	5	6
Frequency	9	7	8	7	6	13

(a) The relative frequency of throwing a 1 was calculated as $\frac{9}{50} = 0.18$.

What was the relative frequency of throwing a 6?
Give your answer as a decimal. [1]

13 = 0.26
50

(b) The number 4 was thrown 7 times in the first 50 throws.
Using this fact, calculate how many times you would expect a 4 to be thrown when this dice is thrown 3000 times. [2]

7 x 3000 = 3000 x 7 = 420
50 50

(c) How many times would you expect a 4 to be thrown when a fair dice is thrown 3000 times? [2]

1 x 3000 = 3000 x 1 = 500
6 6

WJEC INTERMEDIATE TIER CIRCLE THEOREM WORKSHEET

PQ and *PR* are tangents to a circle with centre *O*.
$\hat{RPQ} = 30°$.

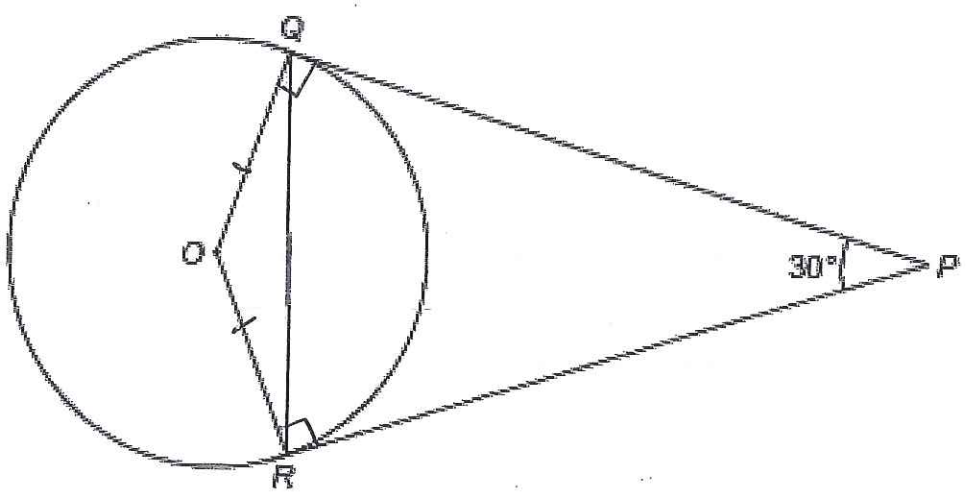


Diagram not drawn to scale

Find the size of $\hat{OQR}$.

You must indicate any angles you calculate.
You must give a reason for each stage of your working.

When a tangent touches a radius it creates 90°

$\hat{QOR} = 360 - (90 + 90 + 30)$

$= 360 - 210$

$= 150°$

$OQ = OR$ ∴ isoceles

$180 - 150 = 30°$

$30 \div 2 = 15°$

Points A, B, C and D lie on the circumference of a circle, centre O.
BD is a diameter of the circle.
The straight line $BC = 4{\cdot}7$ cm and $B\hat{A}C = 28°$.

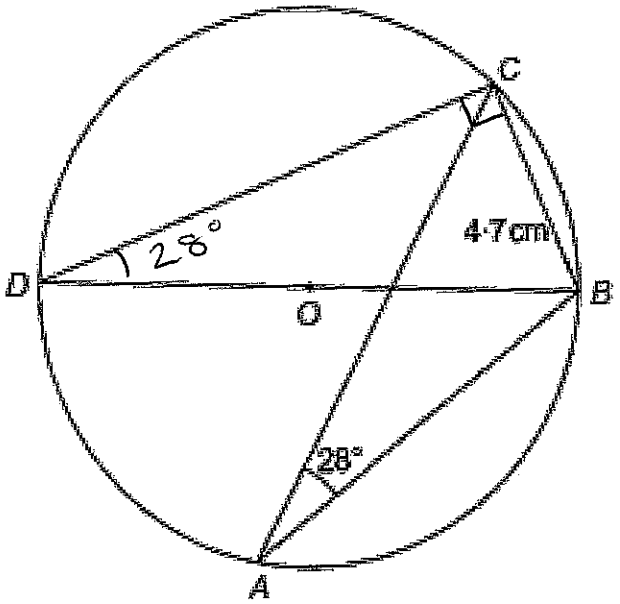
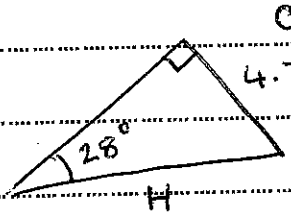


Diagram not drawn to scale

Write down the size of $B\hat{D}C$.
Hence, calculate the length BD.
You must show all your working. [5]



SOH CAH TOA

$\sin\theta = \frac{O}{H}$ $\quad \sin 28 = \frac{4.7}{H}$

$\times H \downarrow \times H$

$H \times \sin 28 = 4.7$

$\div \sin 28 \downarrow \div \sin 28$

$H = \frac{4.7}{\sin 28}$

$H = 10.0$ cm

Points A, B and C lie on the circumference of a circle, centre O.
$A\hat{C}B = 37°$.

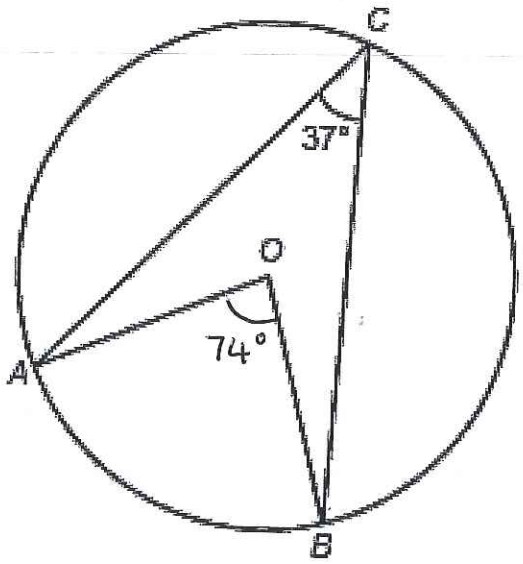


Diagram not drawn to scale

Calculate the size of the reflex angle $A\hat{O}B$. [2]

$360 - (37 \times 2) = 360 - 74$

$= 286°$

WJEC INTERMEDIATE TIER PERCENTAGES WORKSHEET

Show clearly whether the following statement is true or false. [4]

'If you increase a positive number by 10% and then decrease that new value by 10%, you get back to your original number.'

10 % of 10 = $\frac{10}{10}$ = 1

10 + 1 = 11

10 % of 11 = $\frac{11}{10}$ = 1.1

11 − 1.1 = 9.9

10 ≠ 9.9 ∴ false.

(a) Calculate 39% of £576. [2]

$39\% = \frac{39}{100} = 0.39$

$0.39 \times 576 = £224.64$

(b) Calculate $\frac{3}{7}$ of 100.

Give your answer correct to the nearest whole number. [2]

$\frac{3}{7}$ of $100 = \frac{100}{7} \times 3 = 42.857... = 43$

(c) How many quarters are there in 10? [1]

$10 \times 4 = 40$

(d) What fraction is equal to 50% of $\frac{1}{6}$? [1]

$50\% = \frac{1}{2}$ $\quad \frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$

(e) Circle the fraction that is a recurring decimal. [1]

$\frac{21}{35}$	$\frac{10}{12}$	$\frac{17}{68}$	$\frac{15}{24}$	$\frac{51}{170}$
↓	↓	↓	↓	↓
0.6	$0.8\dot{3}$	0.25	0.625	0.3

(a) Calculate 8% of £3.25. [3]

$8\% = \frac{8}{100} = 0.08$

$0.08 \times 3.25 = £0.26$

(b) Evaluate $0.65 \times 280 - \frac{2}{9}$ of 513. [3]

$0.65 \times 280 - \frac{2}{9}$ of 513

$= 0.65 \times 280 - \frac{2}{9} \times 513 = 0.65 \times 280 - \frac{513 \times 2}{9}$

$= 182 - 114$

$= 68$

(c) Calculate $3.5^2 - \sqrt{8.6}$.

Give your answer correct to 2 decimal places. [2]

$3.5^2 - \sqrt{8.6} = 12.25 - 2.9325...$

$= 9.317...$

$= 9.32$

(a) Express 54 as a percentage of 129.
Give your answer to the nearest whole number. [3]

$\frac{54}{129} \times 100 = 41.86...\%$

$= 42\%$

(b) Share 25·8 kg in the ratio 5 : 1. [2]

A: $5+1 = 6$

D: $\frac{25.8}{6} = 4.3$

AM: $5 \times 4.3 = 21.5\text{kg}$

$1 \times 4.3 = 4.3\text{kg}$

21.5 kg and 4.3 kg

Write down five numbers that satisfy all of the following conditions:

- They are all between 1 and 9 inclusive.
- They have a median value of 6.
- They have a range of 7.
- Their mean is 5.

[3]

$\frac{x}{5} = 5$

$\times 5 \downarrow \times 5$

$x = 25$ - must add to 25

1	3	6	7	8

Write down three integers, all less than 25, whose

- range is 8, and
- mean is 13.

[2]

$\frac{x}{3} = 13$

$\times 3 \downarrow \times 3$

$x = 39$ - must add to 39

The three integers are 10, 11 and 18

(a)

11	23	5	9	18	20	

A number is to be written on the blank card.

The mode and the median of all seven numbers are both the same.

Find one possible number that can be written on the blank card. [1]

5, 9, 11, (18), 20, 23, x

↑

Median is 18, to make mode 18 extra card must be 18

Number on card 18

(b) One extra number is added to the following list of three numbers.

6 8 13

The mean of the new list of four numbers is 1 less than the mean of the original three numbers.

What number was added to the list? [4]

$\frac{6+8+13}{3} = 9$

$\frac{6+8+13+x}{4} = 8$

$\frac{27+x}{4} = 8$

$\times 4 \downarrow \times 4$

$27 + x = 32$

$-27 \downarrow -27$

$x = 5$

Number added 5

A right-angled triangle *LMN* is shown below.
LN = 16·9 cm and *LM* = 6·5 cm.

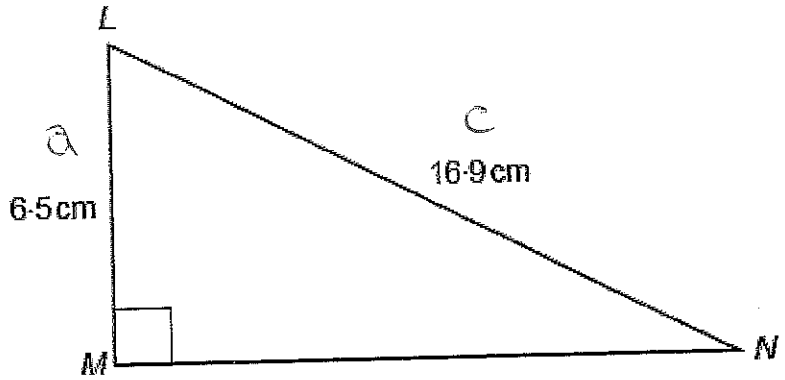


Diagram not drawn to scale

b

Calculate the length *MN*. [3]

$c^2 - a^2 = b^2$

$16.9^2 - 6.5^2 = b^2$

$243.36 = b^2$

$\sqrt{\quad} \downarrow \sqrt{\quad}$

$15.6\text{cm} = b$

A triangular prism of length 2 metres is shown below.

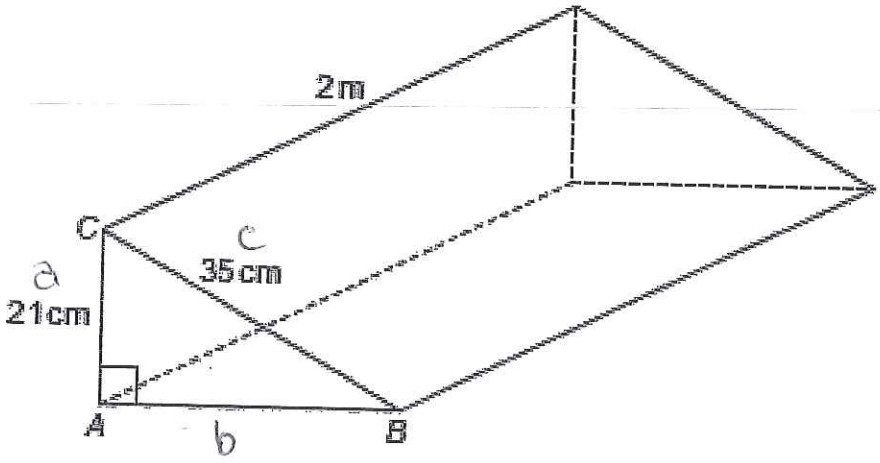


Diagram not drawn to scale

$AC = 21$ cm, $BC = 35$ cm and $\hat{BAC} = 90°$.

(a) Calculate the area of triangle ABC.
Give your answer in cm^2.
You must show all your working. [5]

$c^2 - a^2 = b^2$

$35^2 - 21^2 = b^2$

$784 = b^2$

$\sqrt{\quad} \downarrow \sqrt{\quad}$

$28\text{cm} = b$

$A = \frac{b \times h}{2}$

$= \frac{28 \times 21}{2}$

$= 294\ cm^2$

WJEC INTERMEDIATE TIER TREE DIAGRAMS WORKSHEET

Alwyn often drives from Bangor to Cardiff.
He always chooses one of two routes for these journeys.
He either travels through Rhayader or through Hereford.
The probability that he travels through Rhayader is 0·7.

Sometimes he decides to stop for a break during his journey.
His decision is independent of the route he takes.

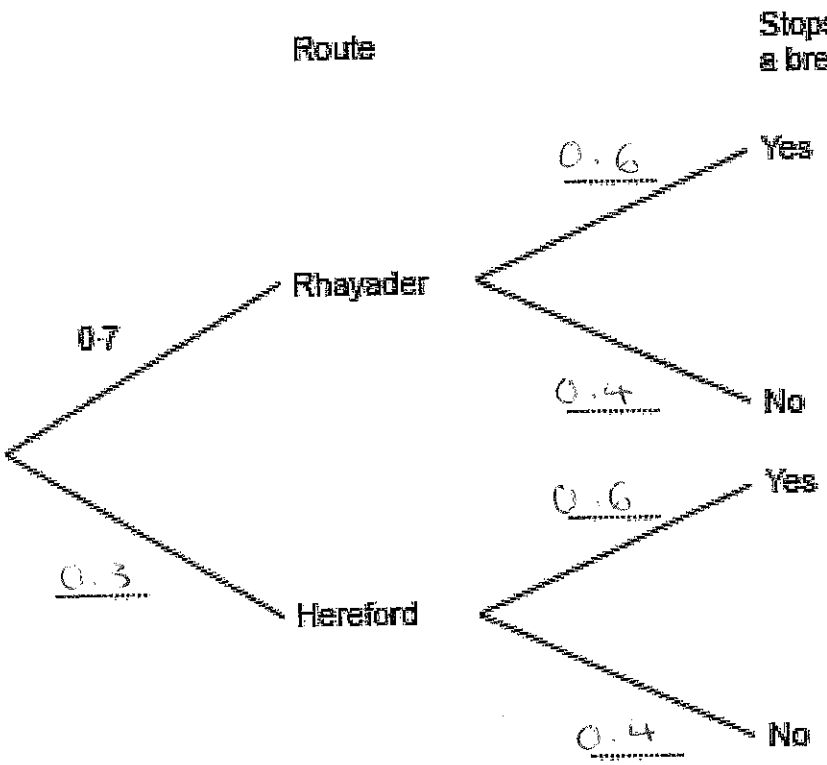
The probability that he travels through Rhayader and stops for a break is 0·42.

(a) Complete the following tree diagram. [4]

$1 - 0.7 = 0.3$ $0.7 \times x = 0.42$ $1 - 0.6 = 0.4$

$\div 0.7 \downarrow \div 0.7$

$x = 0.6$



(b) Calculate the probability that Alwyn travels through Hereford but does not stop for a break. [2]

$0.3 \times 0.4 = 0.12$

7. 100 boxes each contain 10 balls.

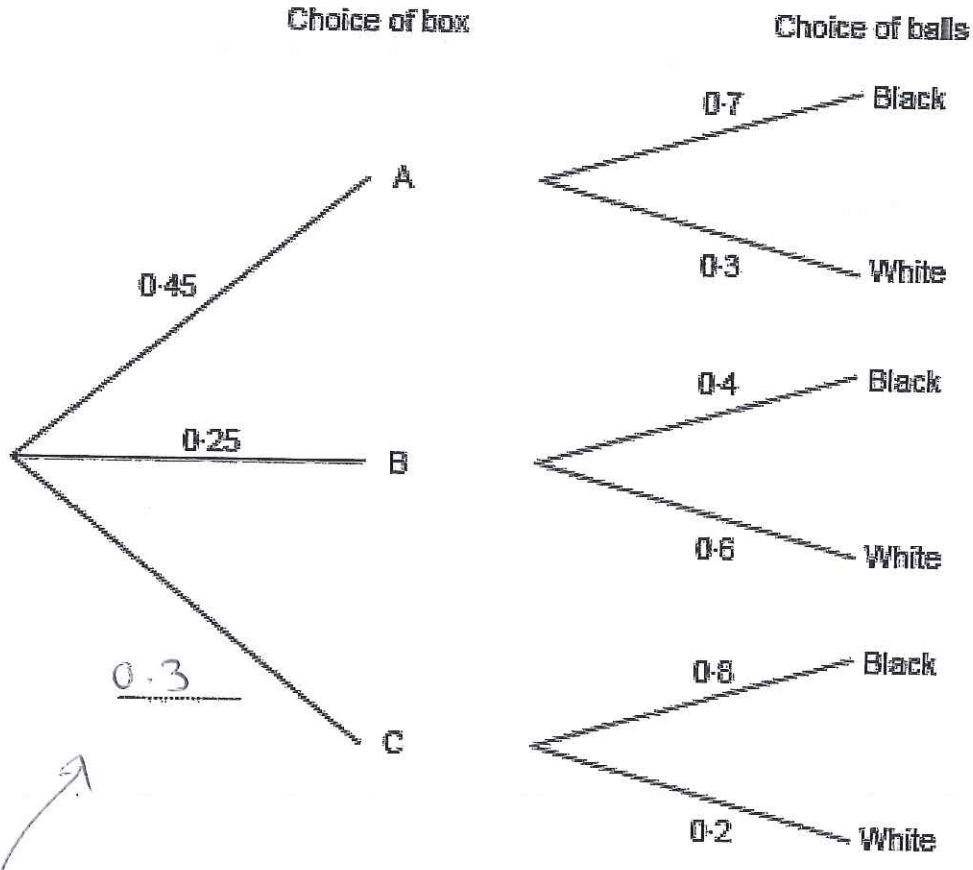
45 of the boxes are labelled A.
They each contain 7 black balls and 3 white balls.

25 of the boxes are labelled B.
They each contain 4 black balls and 6 white balls.

The rest of the boxes are labelled C.
They each contain 8 black balls and 2 white balls.

In a game, a player chooses a box at random, and then chooses a ball at random from that box.

(a) Complete the tree diagram shown below. [1]



(b) What is the probability that a player will select a black ball? [3]

$1 - (0.45 + 0.25) = 1 - 0.7 = 0.3$

$P(\text{Black ball}) = (0.45 \times 0.7) + (0.25 \times 0.4) + (0.3 \times 0.8)$

$= 0.315 + 0.1 + 0.24$

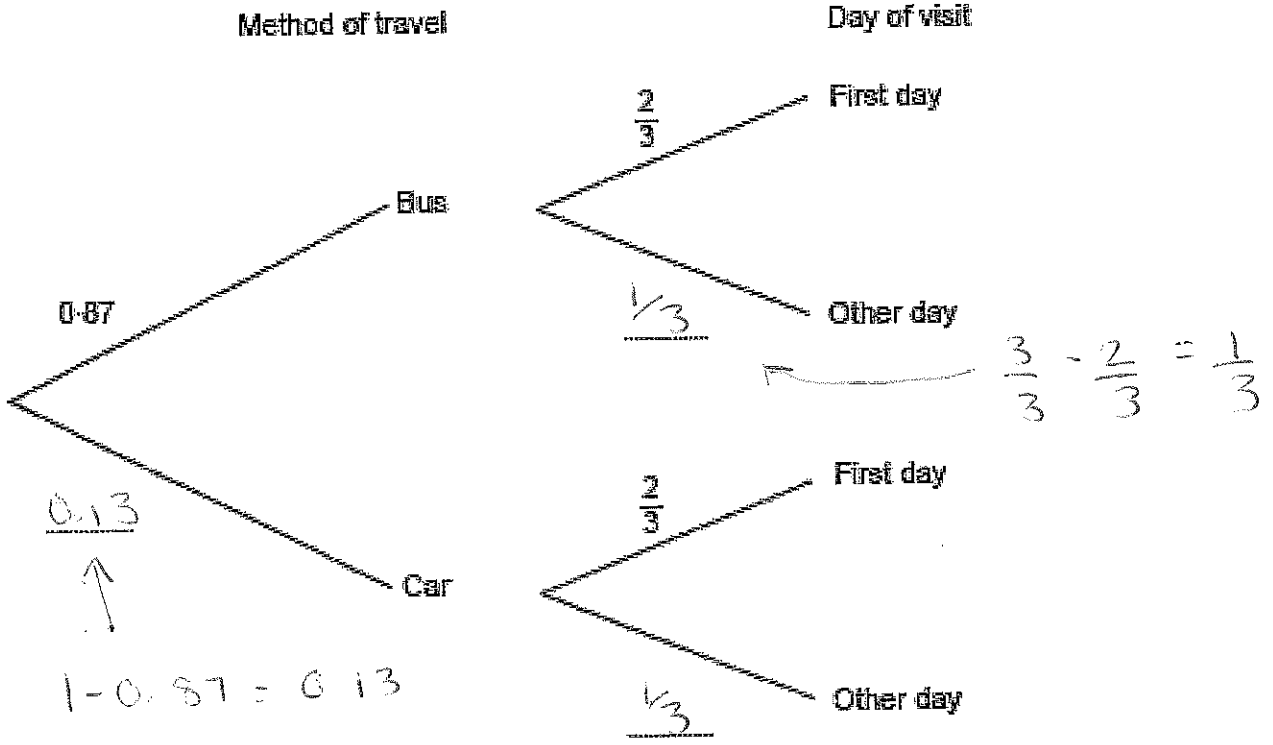
$= 0.655$

3. All the members of a farming club visited the Royal Welsh Agricultural Show.
They all travelled to the show either by bus or by car.
None of them visited the show on more than one day.
The decision to travel by car or by bus was independent of the day of the visit.

A member of the club was selected at random.
The probability that this member travelled by bus was 0·87.

The probability that this member visited the show on the first day was $\frac{2}{3}$.

(a) Complete the tree diagram shown below. [2]



(b) What is the probability that a member, chosen at random, was not one of those who travelled by bus on the first day of the show? [3]

P(Bus & first day) = $0.87 \times \frac{2}{3} = 0.58$

P(Not bus & first day) = 1 - 0.58 = 0.42