AMERICAN ACADEMY LARNACA

MATHEMATICS PLACEMENT EXAM

YEAR 3

SAMPLE 1

DURATION: 2 hours

NAME: .....

Instructions to candidates

Full marks may be obtained for answers to **ALL** questions.

Answer **ALL** questions in the spaces provided in this paper.

Show all stages in any calculations.

Calculators can be used.

This paper has **30** questions.

Question1

i)

There are 28 red pens and 84 black pens in a bag.

Write down the ratio of the number of red pens to the number of black pens.
Give your ratio in its simplest form.

(1)

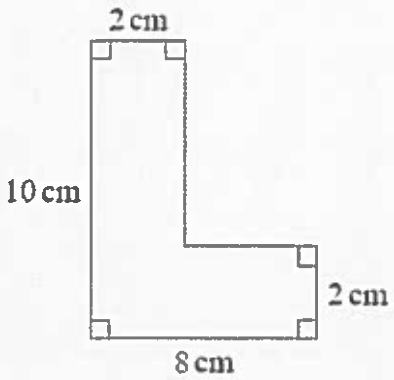
ii)

Ann, Bill and Colin are travelling in a car from Glasgow to Poole.
Ann, Bill and Colin share the driving so that the distances they drive are in the ratio 3:4:4
Ann drives a distance of 210 km.

Calculate the total distance they travelled from Glasgow to Poole.

..... km
(3)

Question2

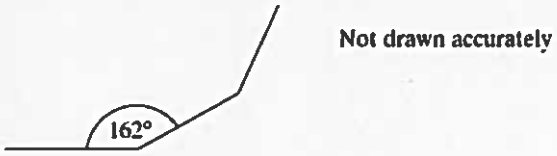


Work out the area of the shape.

(3)

Question3

The diagram shows part of a regular polygon.
Each interior angle is 162°.



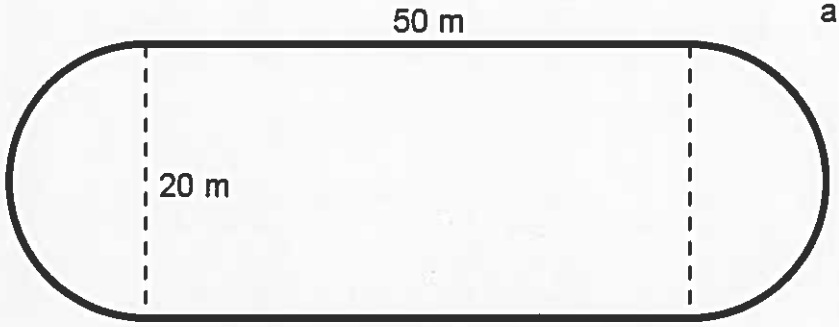
Calculate the number of sides of the polygon.

..... **(2)**

Question4

The diagram represents a running track.

Diagram NOT accurately drawn



Calculate

(a) The *perimeter* of the running track. Give your answer correct to 2 decimal places.

.....*m*

(3)

(b) The *area* enclosed by the running track. Give your answer correct to 2 decimal places.

..... m^2

(2)

Question5

(a) Solve $7x + 18 = 74$

$x =$ .....

(2)

(b) Solve $4(2y - 5) = 32$

$y =$ .....

(2)

(c) Solve $5p + 7 = 3(4 - p)$

$p =$ .....

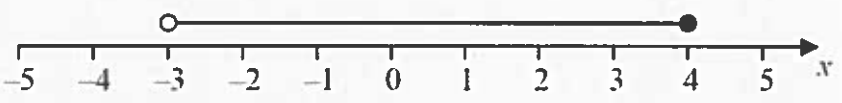
(3)

Question6

(*a*) Solve the inequality $6y + 5 > 8$

..... **(2)**

(*b*) Here is an inequality, in x, shown on a number line.



Write down the inequality.

..... **(2)**

Question7

Here are the equations of four straight lines.

Line A $y = 2x + 4$
Line B $2y = x + 4$
Line C $2x + 2y = 4$
Line D $2x - y = 4$

Two of these lines are parallel.
Write down the two parallel lines.

Line ..... and line .....

(2)

Question8

A straight line, **L**, passes through the point with coordinates (4, 7) and is perpendicular to the line with equation $y = 2x + 3$.

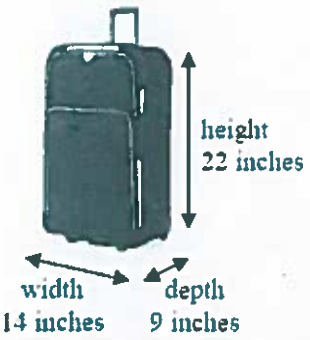
Find an equation of the straight line **L**.

.....

(3)

Question9

An American airline has a maximum size for bags on its planes.
The diagram shows the maximum dimensions.



Chris has a bag.

It has
height 50 cm
width 40 cm
depth 20 cm

1 inch = 2.54 cm

Can Chris take this bag on the plane?
You must show your working.

(4)

Question10

There are 500 passengers on a train.

$\frac{7}{20}$ of the passengers are men.

40% of the passengers are women.

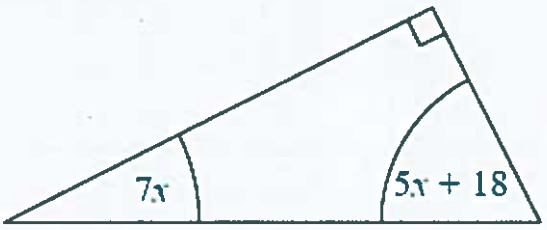
The rest of the passengers are children.

Work out the number of children on the train.

(3)

Question11

The diagram shows a right-angled triangle.



All the angles are in degrees.

Work out the size of the smallest angle of the triangle.

(2)

Question12

Expand and simplify the following expressions:

(a) $(a-5b)(a+b) =$

(b) $(x-2y)(3x-4y) =$

(c) $(p-3t)^2 =$

(6)

Question13

Solve the simultaneous equations

$$2x + 3y = -3$$

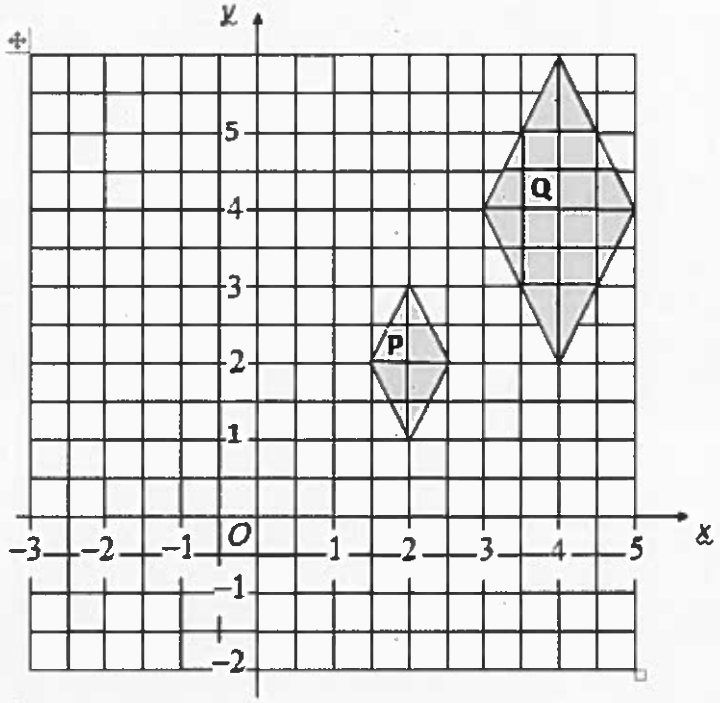
$$3x - 2y = 28$$

$x =$ .....

$y =$ .....

(4)

Question14



(i) Describe fully the single transformation that maps shape **P** onto shape **Q**.

.....

.....

(3)

(ii) Reflect shape **P** in the line $x = 1$

(2)

Question15

In a sale, normal prices are reduced by 20%.
The normal price of a coat is reduced by £15

Work out the normal price of the coat.

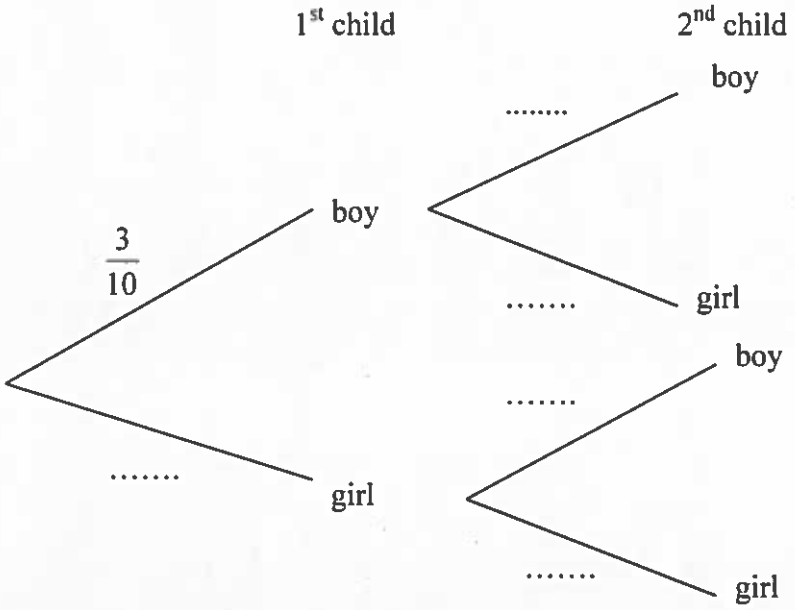
£.....

(2)

Question16

There are 3 boys and 7 girls at a playground.

Mrs Gold selects two children at random.



(a) Complete the tree diagram.

(2)

(b) Work out the probability that Mrs Gold selects two girls.

.....

(2)

(c) Work out the probability that Mrs Gold selects one girl and one boy

.....

(2)

(d) Work out the probability that Mrs Gold selects at least one boy.

.....

(2)

Question17

a) A can of drink is in the shape of a cylinder.
The can has a radius of 4 cm and a height of 15 cm.

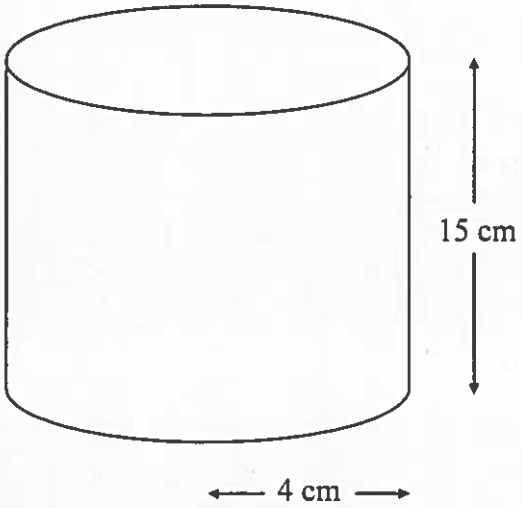


Diagram **NOT** accurately drawn

Calculate the volume of the cylinder.
Give your answer correct to 3 significant figures.

.....

(3)

b) Given the mass of the can to be 25g. Calculate the **density** correct to 2 decimal places.

.....

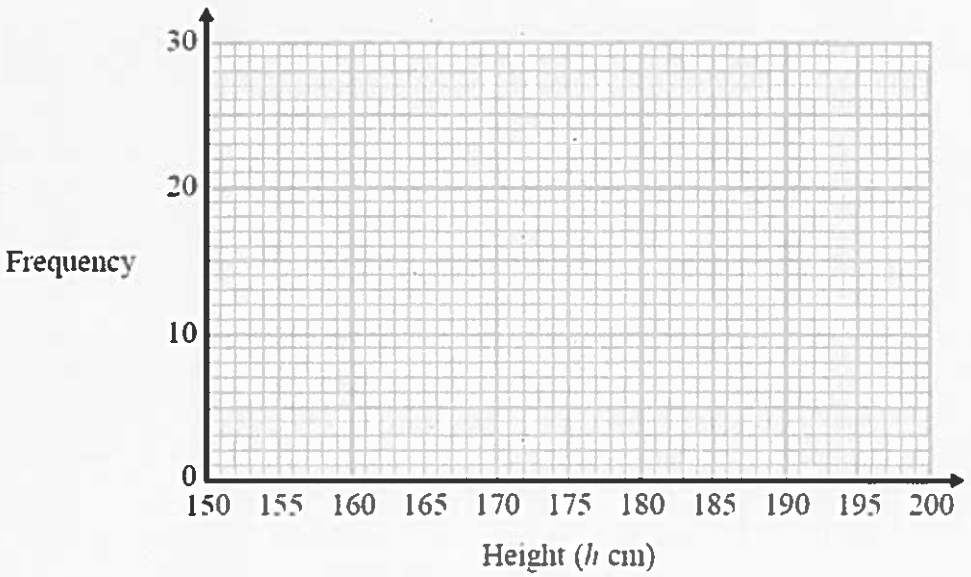
(2)

Question18

The frequency table gives information about the heights of some people.

Height (h cm)	Frequency
$160 < h \leq 165$	2
$165 < h \leq 170$	5
$170 < h \leq 175$	10
$175 < h \leq 180$	21
$180 < h \leq 185$	16
$185 < h \leq 190$	4

a) Draw a **bar chart** and a **frequency polygon** for this information. **(4)**



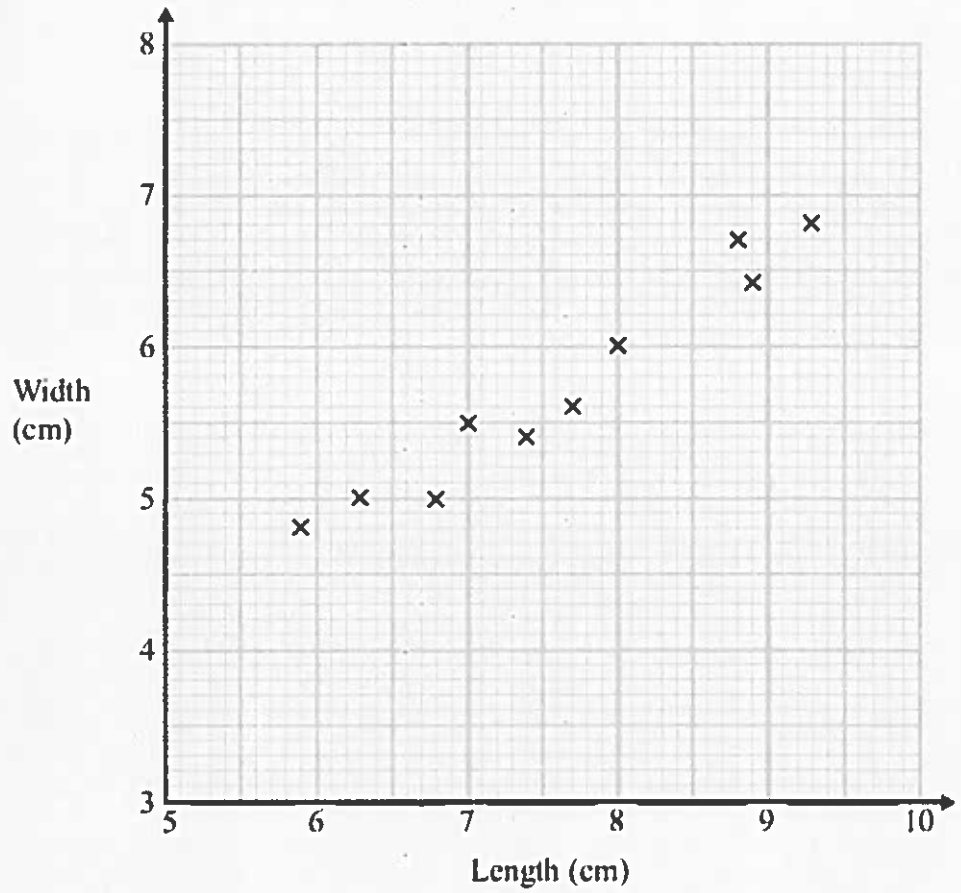
b) Find the range

(1)

c) Find the modal group **(1)**

Question19

The scatter graph shows some information about ten pine cones from the same tree.
It shows the length and the width of each pine cone.



(*a*) Describe the relationship between the length and the width of a pine cone.

.....

.....

(1)

Another pine cone from this tree has a length of 8.4 cm.

(*b*) Estimate the width of this pine cone.

.....cm

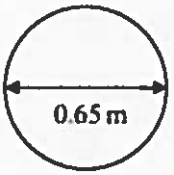
(2)

Question 20

The diameter of a wheel on Harry's bicycle is 0.65 m.

(a) Calculate the circumference of the wheel.
Give your answer correct to 2 decimal places.

Diagram NOT accurately drawn



..... m
(2)

Harry cycles 1000 metres.

(b) Calculate the number of turns the wheel makes.

.....
(2)

Question 21

Make t the subject of the formula $s = \frac{t}{3} - 2a$

(2)

Question 22

Nicola invests £8000 for 3 years at 5% per annum **compound** interest.

(*a*) Calculate the value of her investment at the end of 3 years.

£.....

(3)

Hannah invested an amount of money in an account paying 5% per annum **compound** interest.

After 1 year the value of her investment was £3885

(*b*) Work out the amount of money that Hannah invested.

£.....

(2)

Question 23

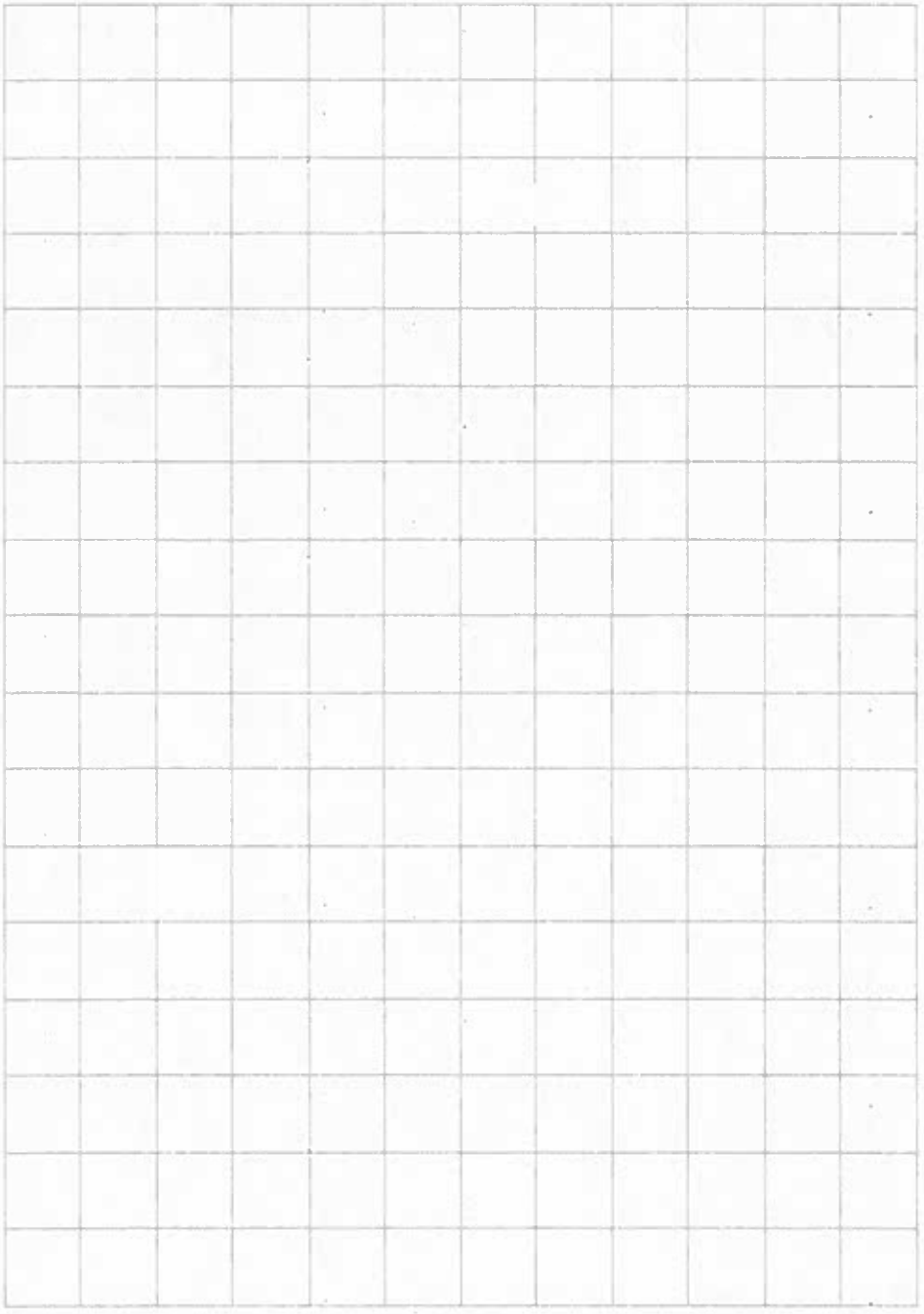
(a) Complete the table for $y = x^2 - 3x + 1$

x	–2	–1	0	1	2	3	4
y	11		1	–1		1	5

(2)

(b) On the grid opposite, draw the graph of $y = x^2 - 3x + 1$

(2)



Question 24

(*a*) Simplify

(i) $3a + 4b - 2a - b$

.....

(ii) $5x^2 + 2x - 3x^2 - x$

.....

(4)

(*b*) Expand the brackets

(i) $4(2x - 3)$

.....

(ii) $p(q - p^2)$

.....

(2)

(*c*) Expand and simplify $5(3p + 2) - 2(5p - 3)$

.....

(2)

Question 25

P, *Q* and *R* are three stations on a railway line.

PQ = 26 miles.
QR = 4 miles.

A passenger train leaves *P* at 12.00. It arrives at *Q* at 12 30.

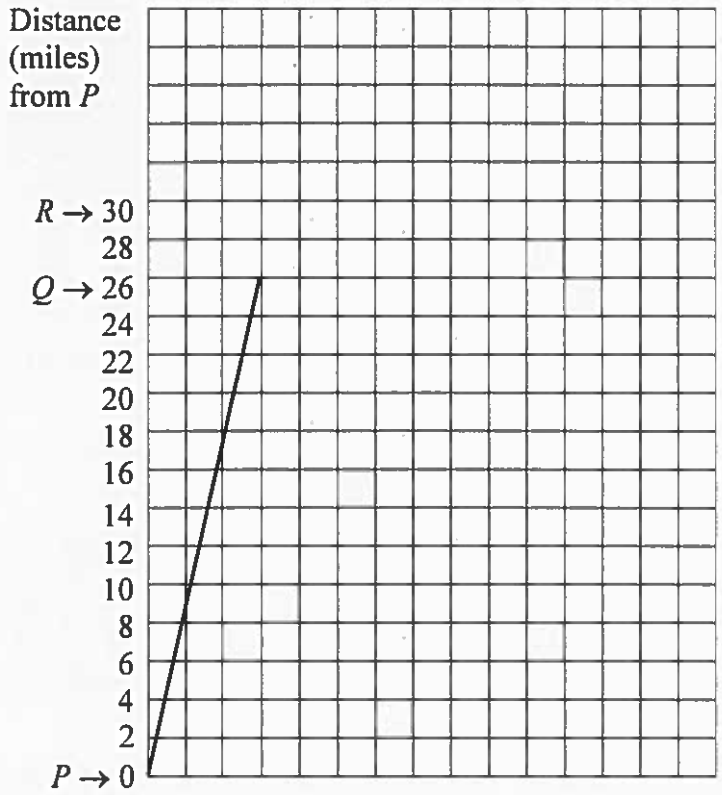
Information about the journey from *P* to *Q* is shown on the travel graph opposite.

The passenger train stops at *Q* for 10 minutes.
It then returns to *P* at the same speed as on the journey from *P* to *Q*.

(a) Calculate the speed from P to Q. **(3)**

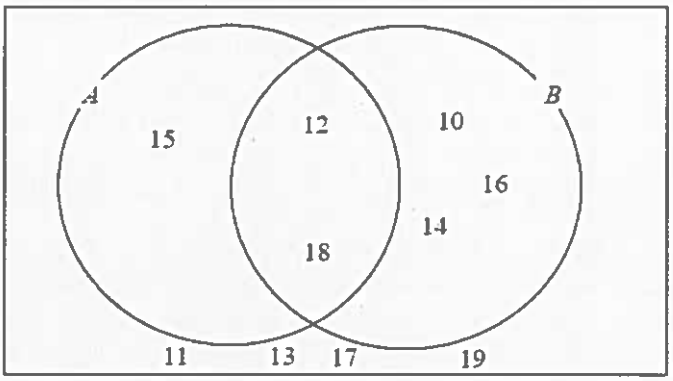
On the grid, complete the travel graph for this train.

(2)



Question 26

Here is a Venn diagram.



(a) Write down the numbers that are in set

(i) $A \cup B$

.....

(ii) $A \cap B$

.....

(2)

Question 27

(a) Factorise fully

$$2p^2 - 4pq$$

.....

(2)

(*b*) Factorise fully

$$x^2 + 7x + 6$$

.....

(2)

Question 28

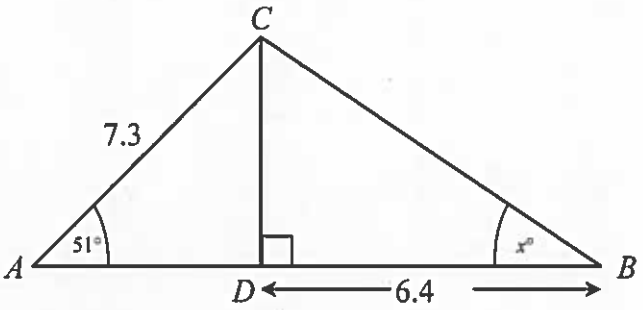


Diagram **NOT** accurately drawn

The diagram shows a triangle ABC.
The line CD is perpendicular to the line AB.
$AC = 7.3$ cm, $BD = 6.4$ cm and angle $BAC = 51°$.

Calculate the size of the angle marked $x°$.
Give your answer correct to 1 decimal place.

(3)

Question 29

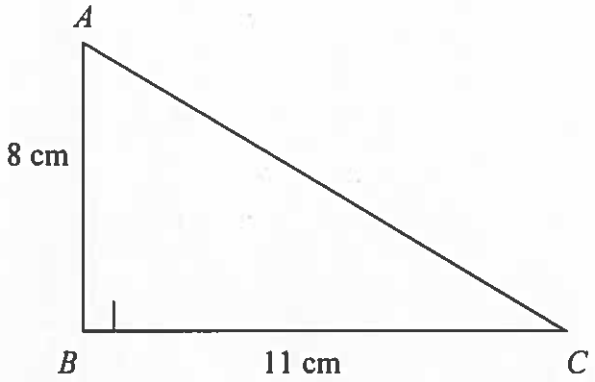


Diagram **NOT** accurately drawn

ABC is a right-angled triangle, $AB = 8$ cm, $BC = 11$ cm.

Calculate the length of AC.
Give your answer correct to 3 significant figures.

..... cm

(2)

Question 30

Tony throws a biased dice 100 times.
The table shows his results

Score	Frequency
1	12
2	13
3	17
4	10
5	18
6	30

He throws the dice once more.

(*a*) Find an estimate for the probability that he will get a 6.

.....

(1)

Emma has a biased coin.
The probability that the biased coin will land on a head is 0.7
Emma is going to throw the coin 250 times.

(*b*) Work out an estimate for the number of times the coin will land on a head.

.....

(2)