

Answer **all** questions.

1. A shop sells bracelets.
Words can be engraved on the bracelet and charms can be added.
The price list is shown below.

**Price List**

Flower charm
£18



Heart charm
£13.20



Star charm
£37.54



Bracelet
£45

ABCDE Engraving
84p for each letter

- (a) Rhian buys a bracelet with a five-letter word engraved on it.
She also buys a heart charm.
What is the total cost of these items?

[2]

$$(5 \times 0.84) + 13.20 + 45 = \underline{\pounds 62.40}$$

- (b) Huw spent £187.70 on star charms.
How many star charms did he buy?

[1]

$$\div 37.54 = \underline{5}$$

- (c) Caitlyn has a special offer voucher.

Voucher

One bracelet and four
flower charms for £95

Caitlyn bought one bracelet and four flower charms using the voucher.
How much cheaper is it to buy these items using the voucher than paying the
usual price?

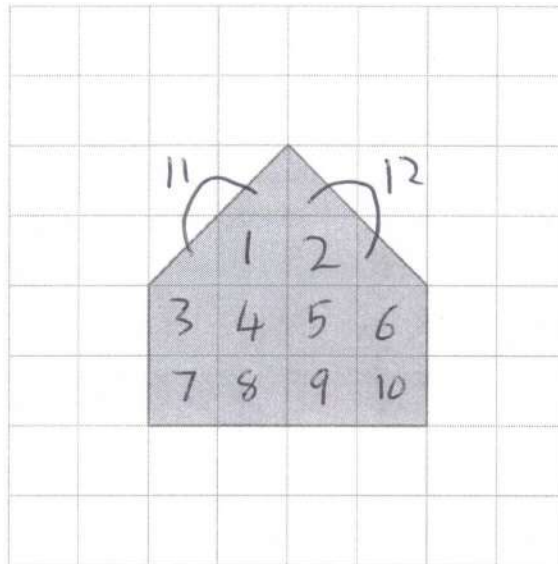
[2]

$$45 + (4 \times 18) = 117$$

$$117 - 95 = \underline{\pounds 22}$$



2. A shape is drawn on the 1 cm square grid below.



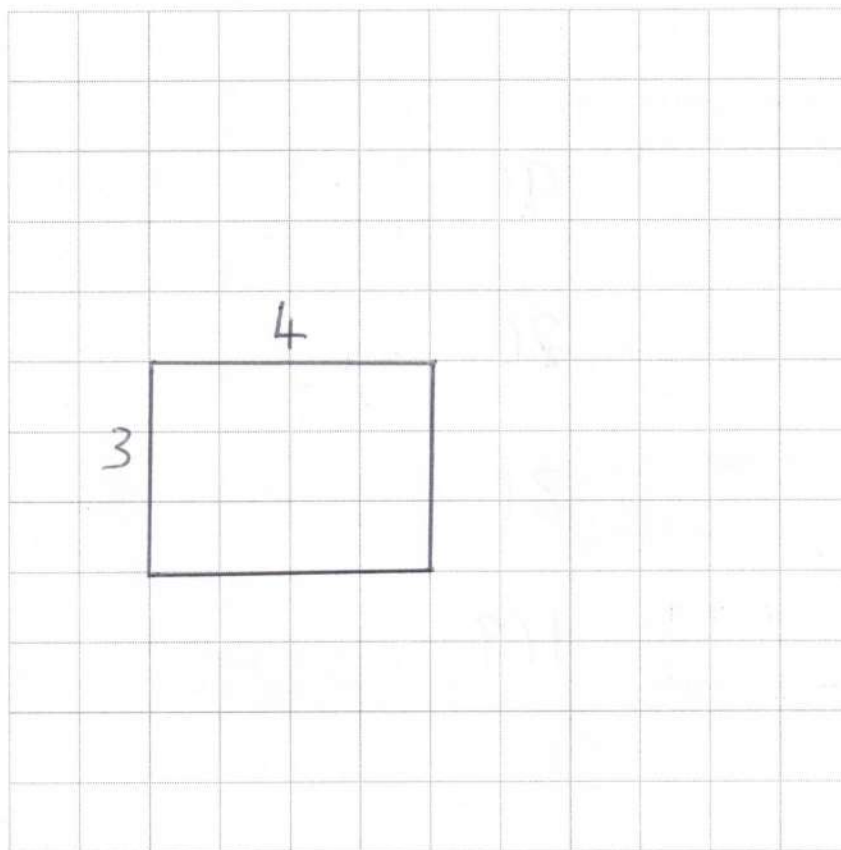
- (a) What is the area of the shape?

[1]

The area of the shape is 12 cm²



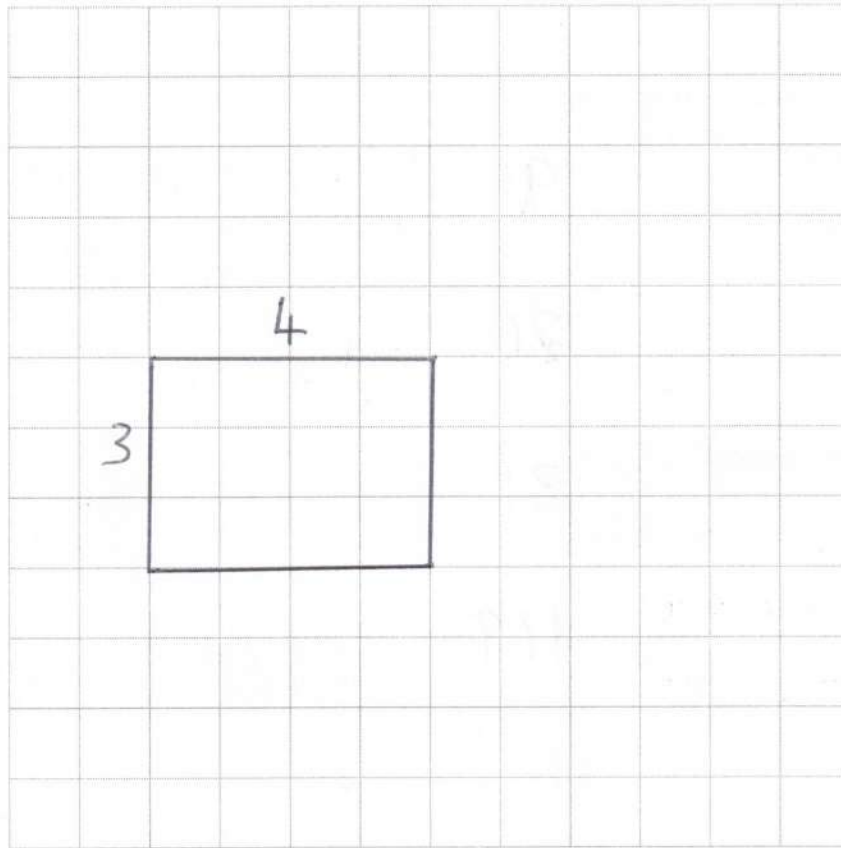
- (b) On the 1 cm square grid below, draw a **rectangle** with the same area as the shape on page 4. [1]



OR $12 \times 1, 6 \times 2$



- (b) On the 1 cm square grid below, draw a **rectangle** with the same area as the shape on page 4. [1]

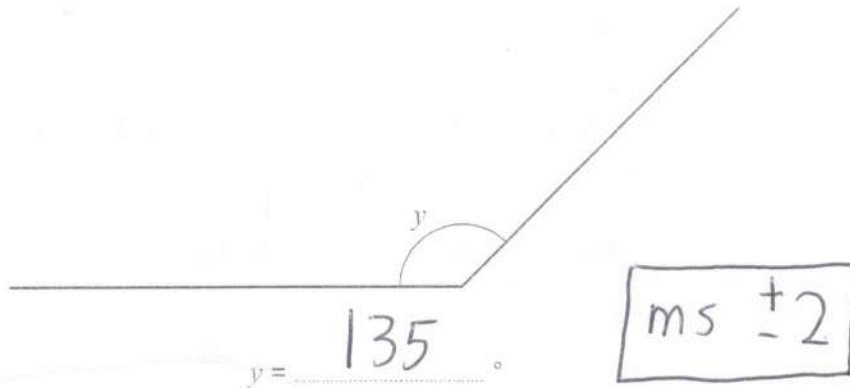


OR $12 \times 1, 6 \times 2$

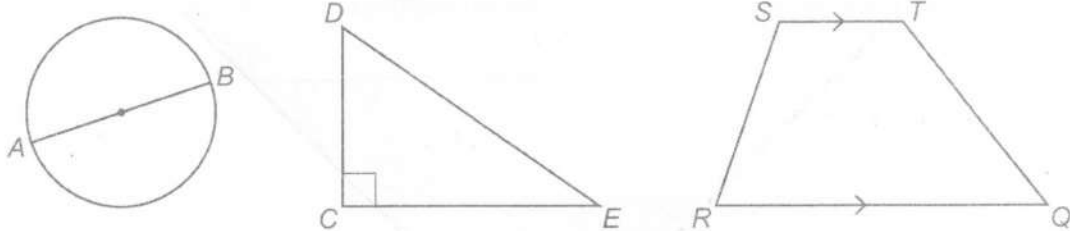


4. (a) Measure and write down the size of angle y .

[1]



- (b) A circle, a right-angled triangle and a trapezium are shown below.



circumference

parallel

tangent

isosceles

perimeter

radius

perpendicular

diameter

Use the correct words from the list above to complete each of the following sentences.

- (i) The line AB is a diameter [1]
- (ii) The lines CD and CE are perpendicular [1]
- (iii) The lines ST and RQ are parallel [1]



- (c) Sadia describes a 3D shape.
She says,

This 3D shape has 5 vertices, 8 edges and 5 faces.

Which one of the 3D shapes listed below could be the one Sadia is describing?

Circle your answer.

[1]

cuboid

triangular prism

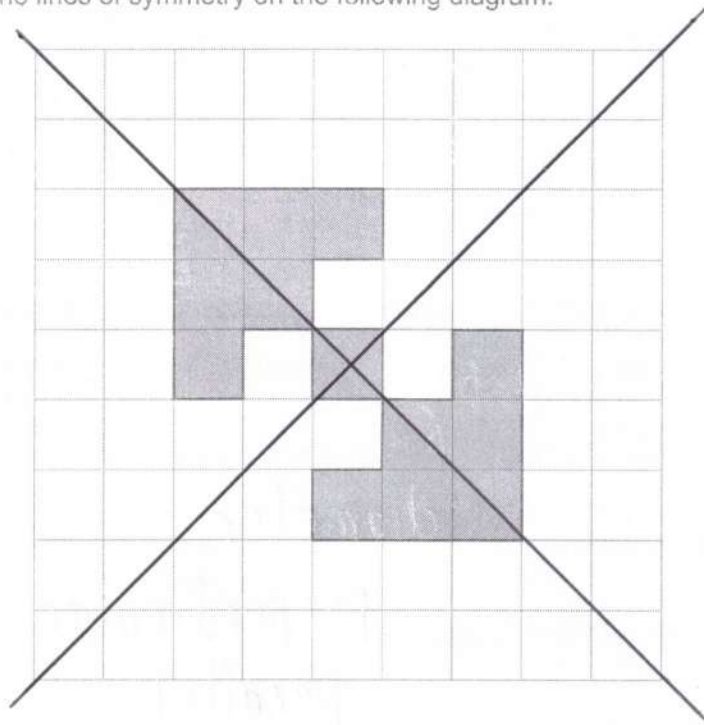
cube

square-based pyramid

cone

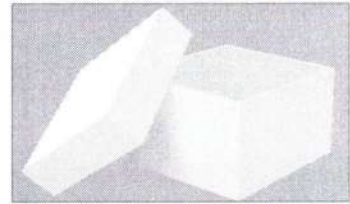
- (d) Mark all the lines of symmetry on the following diagram.

[2]



5. Austin owns a cake shop.

(a) He sells his cakes in boxes.



Austin buys some boxes.

Each box costs £1.35.

He pays a total of £63.75 which includes a £3 delivery charge.

How many boxes did Austin buy?

[2]

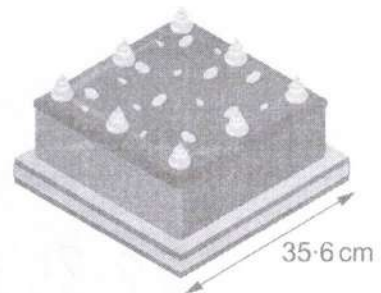
$$\begin{array}{r} 63.75 - 3 \\ \hline 1.35 \end{array} = \underline{\underline{45}}$$

(b) Austin uses cake boards to display his cakes. Each board is square with sides of length 35.6 cm. He puts ribbon around the perimeter of the boards for decoration.

Austin has 4 metres of ribbon.

He puts the ribbon around the perimeter of **two** cake boards.

The ribbon does not overlap on either board.



How much ribbon will Austin have left over?

[4]

$$35.6 \times 4 \times 2 = 284.8$$

$$400 - 284.8$$

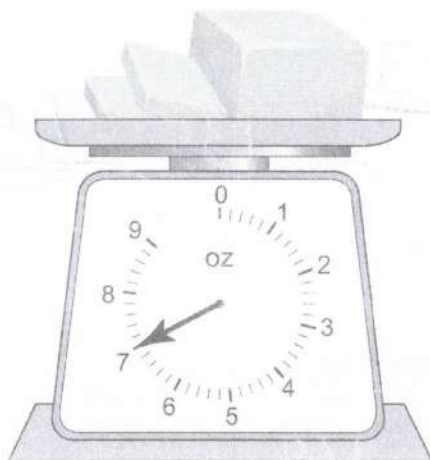
Austin will have 115.2 cm of ribbon left over.



- (c) Use the information below to convert between ounces and grams.

$$1 \text{ ounce (oz)} = 28.35 \text{ grams (g)}$$

- (i) The scales below show how many **ounces** of butter Austin uses to make 1 cake.



How many **grams** of butter does Austin need to make 3 cakes?

[2]

$$28.35 \times 7 \times 3 = 595.35$$

- (ii) Austin buys bags of sugar.
Each bag has a mass of 500 g.

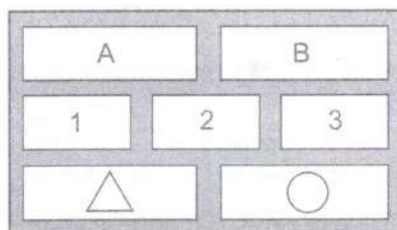
What is the mass of one bag of sugar in **ounces**?
Give your answer to the nearest ounce.

[2]

$$\frac{500}{28.35} = 17.6... = 18 \text{ ounces}$$



6. Jade must enter a code to open her safe by pressing three buttons. The code consists of one letter, one number and one shape.



- (a) List all the possible code combinations. One has been completed for you.

[2]

Letter	Number	Shape
A	1	△
A	1	○
A	2	△
A	2	○
A	3	△
A	3	○
B	1	△
B	1	○
B	2	△
B	2	○
B	3	△
B	3	○

You may not need to use all the lines.

- (b) Jade has forgotten her code. She enters one letter, one number and one shape at random. What is the probability that she enters the correct code?

[1]

$$\frac{1}{12}$$



7. Vikram follows a Mediterranean diet.
The table below shows the proportion of each food group Vikram should eat each day.

Vikram's Mediterranean Diet

Food group	Proportion of diet
Whole grains and pasta	36%
Vegetables and fruit	30%
Fish, meat, and dairy products	20%
Olive oil	9%
Sugar	5%

- (a) What **fraction** of the Mediterranean diet is made up of olive oil and sugar?
Write your answer in its simplest form. [2]

$$\frac{14}{100} = \frac{7}{50}$$

- (b) On Monday, Vikram ate 456 grams of fish, meat, and dairy products. 20%
How many grams of sugar should Vikram have eaten on Monday? [2]

$$5\% \leftarrow 456 \div 4 = \underline{114g}$$

- (c) On Tuesday, Vikram ate a total of 1350 grams of food.
How many grams of whole grains and pasta should Vikram have eaten on Tuesday? [2]

$$1350 \times 0.36 = \underline{486}$$



8. (a) (i) The diagram shows a number machine.

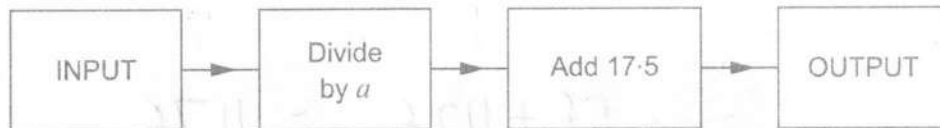


When the OUTPUT is 83.6, what is the INPUT?

[1]

$$(83.6 - 3.5) \div 6.7 = \underline{\underline{13}}$$

- (ii) A different number machine is shown below.



When the INPUT is 22, the OUTPUT is 37.5.
Find the value of a .

[2]

$$\frac{22}{a} + 17.5 = 37.5$$

$$\frac{22}{a} = 20 \quad a = \frac{22}{20} = 1.1$$



- (b) The original price of a toy is £ t .
In a sale, the toy is one third of its original price.
Write down, in terms of t , the sale price of the toy.

$$\frac{1}{3}t$$

[1]

- (c) A bag contains x sweets.
Rona buys 8 of these bags.
She also has 5 sweets left from a previous bag of sweets.
Write down, in terms of x , the total number of sweets Rona has.
Simplify your answer.

$$8x + 5$$

[2]

- (d) Simplify $5f + 16f \times 7$.

$$= 5f + 112f = 117f$$

[2]

- (e) Expand $8(9p - 3)$.

$$= 72p - 24$$

[1]

- (f) Solve $5x - 2 = 11$.

$$5x = 13$$

[2]

$$x = \frac{13}{5} = 2\frac{3}{5} = 2.6$$

- (g) What is the square root of 31?
Give your answer correct to 2 decimal places.

[2]

$$\sqrt{31} = 5.5677... = 5.57$$



9. The table below shows distances between some places in New Zealand.

All distances are in kilometres (km).

New Plymouth	357	797			
Rotorua	234	670	290		
Thames	114	550	414	349	
Wellington	658	1094	718	323	<u>380</u>
Whakatane	298	737	205	308	165
	Auckland	Cape Reinga	Hicks Bay	Napier	Taupo

Use the table to answer the following questions.

- (a) Complete the sentence.

The distance between Thames and Hicks Bay is 414 km.

[1]

- (b) Sharon drove from Wellington to Taupo.
The journey took 4 hours and 30 minutes.

= 4.5

Calculate the average speed of Sharon's journey in kilometres per hour.

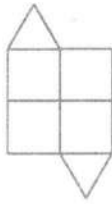
[3]



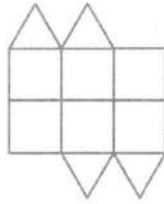
$$S = \frac{380}{4.5} = 84.4 \text{ km/h}$$



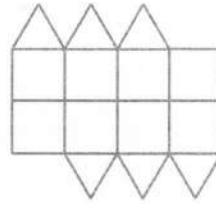
10. (a) The following sequence of patterns is made using squares and triangles.



Pattern 1



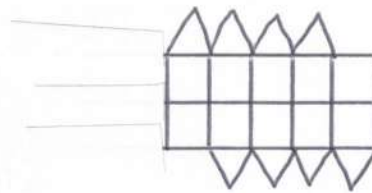
Pattern 2



Pattern 3

- (i) Draw Pattern 5 in the space below.

[1]



- (ii) Is it possible for one of the patterns in the sequence to have 23 squares and 21 triangles?
Give a reason for your answer.

[1]

Yes

☐

No

☒

Squares and triangles are always even

- (iii) Write down the n th term for the number of squares in the pattern.

[2]

4, 6, 8, 10
2 2 2

$2n + 2$

- (b) The n th term of a different sequence is $4n - 5$.
Write down the first 3 terms of the sequence.

[2]

$4 \times 1 - 5 = -1$

-1, 3, 7



11. Mr Gregory plans to buy drinks and crisps for the school shop.
Drinks and crisps are sold in multipacks.
The costs for these are shown below.

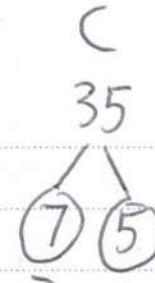
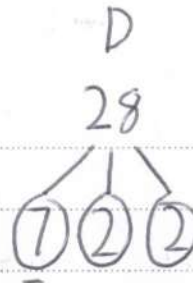
<p>Drinks multipack (28 drinks)</p>  <p>Price: £5.35</p>	<p>Crisps multipack (35 packets)</p>  <p>Price: £4.27</p>
--	--

Mr Gregory buys the **least** number of each multipack so that he has an equal number of drinks and packets of crisps.

How much will this cost?
You must show all your working.

[5]

$$\begin{aligned}
 \text{HCF} &= 7 \\
 \text{LCM} &= 7 \times 2 \times 2 \times 5 \\
 &= 140
 \end{aligned}$$



$$\frac{140}{28} \times 5.35$$

$$\frac{140}{35} \times 4.27$$

$$= 26.75$$

$$= 17.08$$

Total cost is £43.83



12. (a) The exterior angle of a regular polygon is 24° .

(i) How many sides does it have?

[2]

$$\frac{360}{24} = 15$$

(ii) Calculate the sum of all the interior angles of this polygon.

[2]

$$(15-2) \times 180 = 2340^\circ$$



- (b) The diagram below shows a quadrilateral $QRST$.
 QS is parallel to UT .
 $\angle RQS = 84^\circ$, $\angle RQT = 110^\circ$ and $QR = RS$.

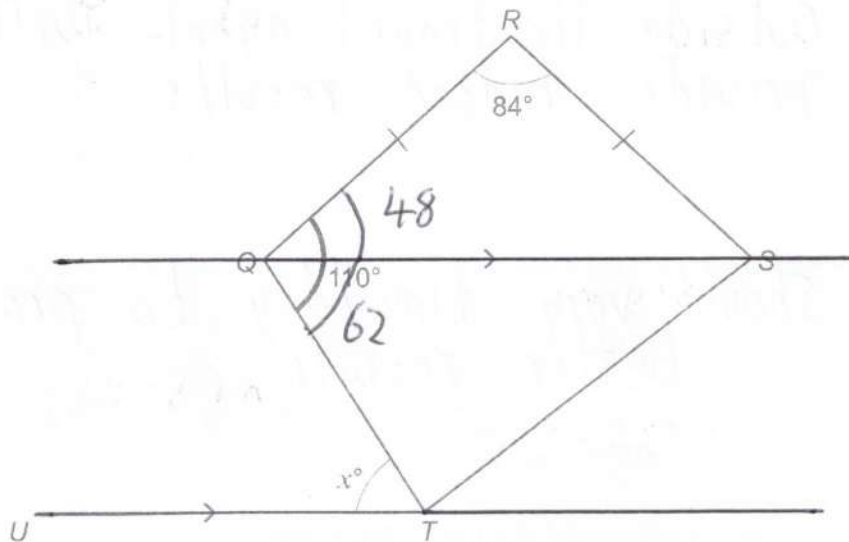


Diagram not drawn to scale

Calculate the value of x .
 Give a reason for each step of your answer.

[4]

$$\angle RQS = \frac{180 - 84}{2} = 48 \quad (\text{base angles of an isosceles triangle are equal})$$

$$\angle SQT = 110 - 48 = 62$$

$$x = 62 \quad (\text{alternate angles are equal})$$

$$x = 62^\circ$$



13. (a) Cara wants to find out if people travel abroad each year and how often. She plans to stand outside her local travel agent on Tuesday afternoon and survey 35 people.
Give **two** reasons why Cara's plan is **not** likely to give reliable results. [2]

Reason 1

Outside the travel agent will
provide biased results

Reason 2

Should vary time/day to provide
better results

- (b) Cara uses a questionnaire to carry out her survey. One of the questions is shown below.

How many times do you travel abroad?

0	<input type="checkbox"/>	1-3	<input type="checkbox"/>	3-4	<input type="checkbox"/>	5 or more	<input type="checkbox"/>
---	--------------------------	-----	--------------------------	-----	--------------------------	-----------	--------------------------

Give **two** criticisms of the question. [2]

Criticism 1

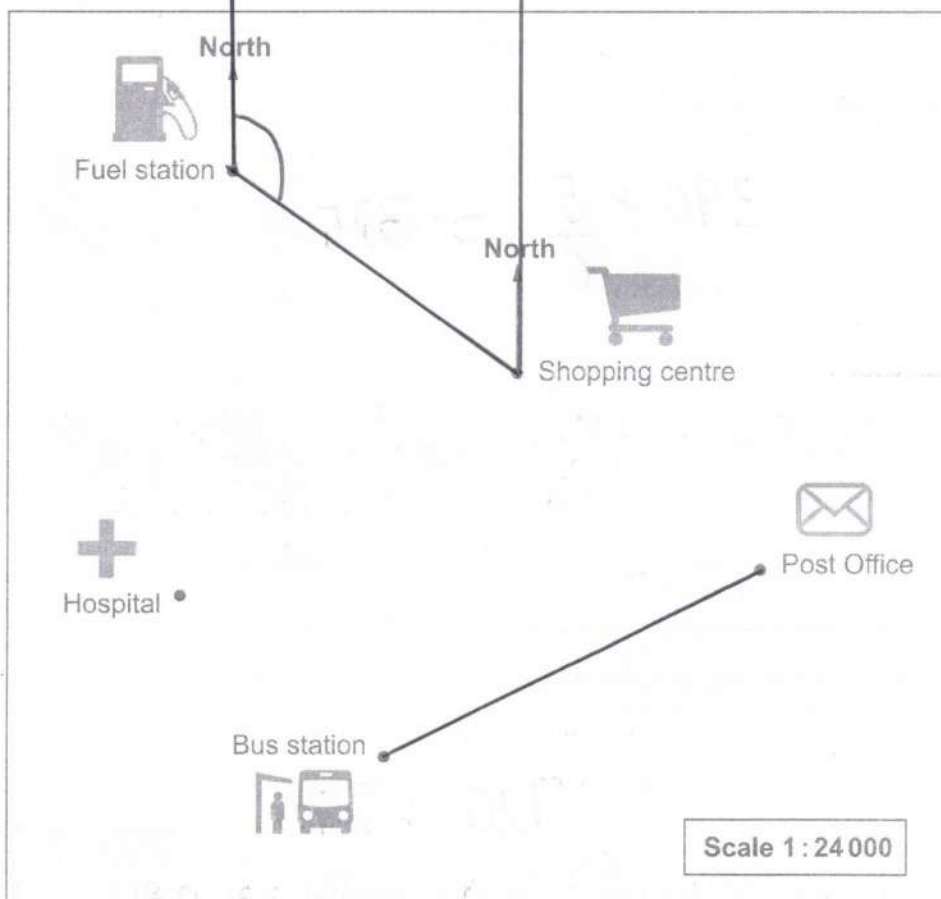
Central boxes overlap

Criticism 2

Question should refer to a
time period



14. The scale drawing below shows the positions of some places in a town.



- (a) What is the straight-line distance between the post office and the bus station?
Give your answer in metres.

[3]

$$6\text{cm} \times 24000 = 144000\text{cm}$$

$$= \underline{1440\text{m}}$$

- (b) What is the bearing of the shopping centre from the fuel station?

[1]

125°

(12)



15. Frank is making some fruit drinks.

0 L

- (a) Frank makes one drink using orange juice and lemonade in the ratio 1 : 5.
He pours 390 ml of this drink into a glass.

How many ml of lemonade will there be in the glass?

[2]

$$390 \times \frac{5}{6} = 325$$

- (b) Frank makes a different drink using apple juice and lemonade.
He pours 120 ml of apple juice into a glass.
He then pours lemonade into the glass until there is 390 ml of drink.

Write down the ratio of apple juice to lemonade in the glass.
Give your answer in its simplest form.

[2]

$$120 : 270$$

$$12 : 27$$

$$4 : 9$$

The ratio is _____ :

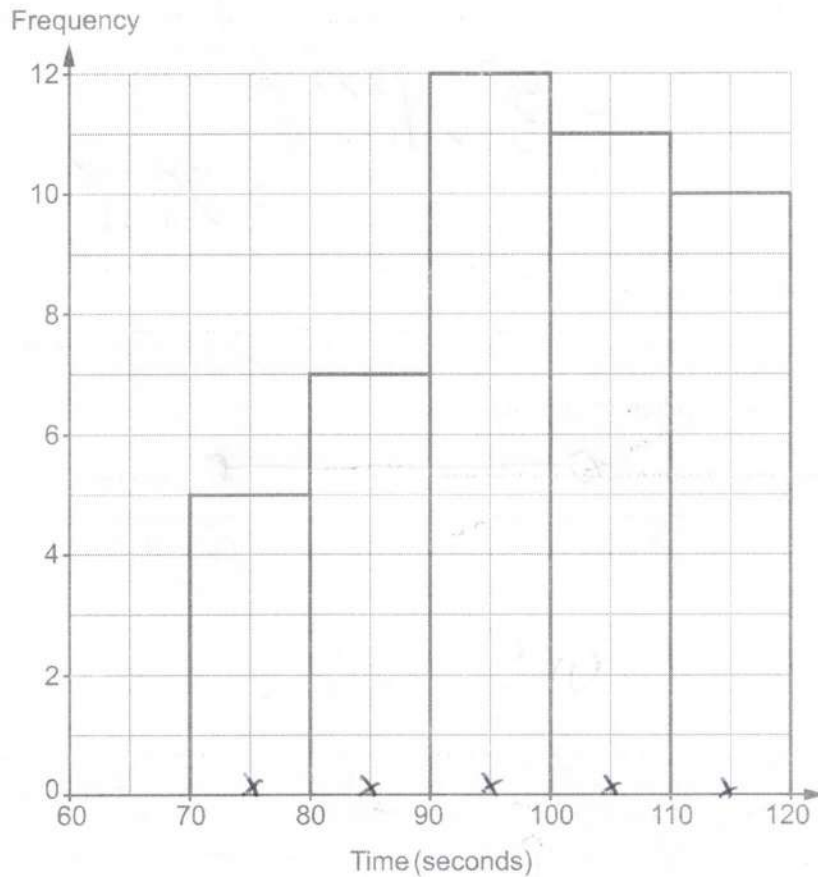
$$A : L$$



16. 45 students took part in a 400 m race.
Their times, in seconds, were recorded.
The frequency diagram below shows the results.

The groups used are as follows:

$70 \leq \text{time} < 80$, $80 \leq \text{time} < 90$, $90 \leq \text{time} < 100$, $100 \leq \text{time} < 110$ and $110 \leq \text{time} < 120$.



Calculate an estimate for the mean time it took to complete the race.

[5]

$$5 \times 75 = 375$$

$$7 \times 85 = 595$$

$$12 \times 95 = 1140$$

$$11 \times 105 = 1155$$

$$10 \times 115 = 1150$$

$$\Sigma = 4415$$

$$\frac{4415}{45} = \frac{883}{9}$$

or 98.1 secs.



17. (a) Factorise
- $x^2 - 5x - 24$
- .

[2]

$$(x+3)(x-8)$$

- (b) Simplify
- $(3h^2)^3$
- .

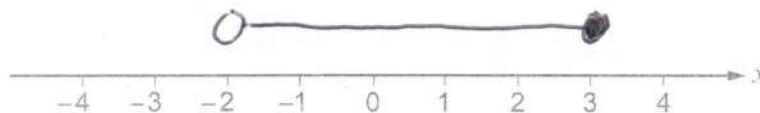
[2]

$$= 3^3 \times h^{2 \times 3}$$

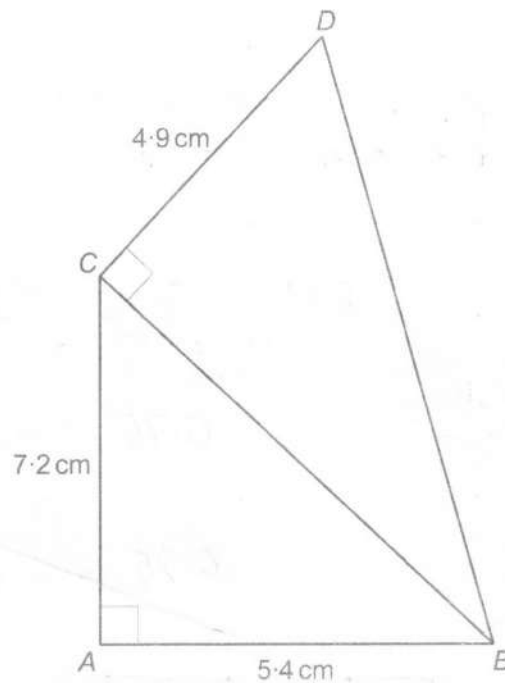
$$= 27h^6$$

- (c) Represent the inequality
- $-2 < x \leq 3$
- on the number line below.

[1]



18.

*Diagram not drawn to scale*

ABC and BCD are right-angled triangles.
 $AB = 5.4$ cm, $AC = 7.2$ cm and $CD = 4.9$ cm.

Calculate the area of triangle BCD .

[5]

$$BC = \sqrt{7.2^2 + 5.4^2} = 9$$

$$\text{Area } BCD = \frac{1}{2} \times 9 \times 4.9$$

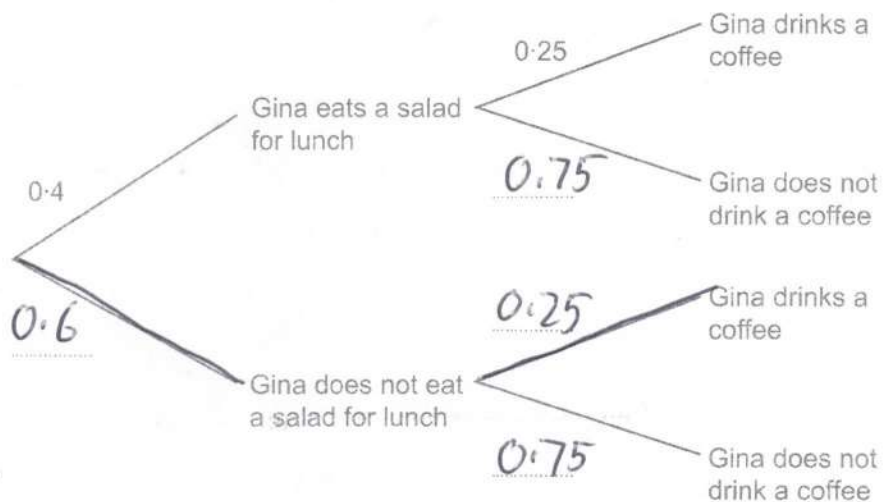
Area of triangle BCD is 22.05 cm²



19. For her lunch, Gina sometimes eats a salad and sometimes drinks a coffee. The probability she eats a salad for lunch on a given day is 0.4. The probability she drinks a coffee on a given day is 0.25. Eating a salad for lunch and drinking a coffee are independent.

(a) Complete the following tree diagram.

[2]



- (b) Calculate the probability that, on a given day, Gina does not eat a salad for lunch but does drink a coffee.

[2]

$$0.6 \times 0.25 = 0.15$$



20. When a ball is dropped, the maximum height it reaches after each bounce decreases.

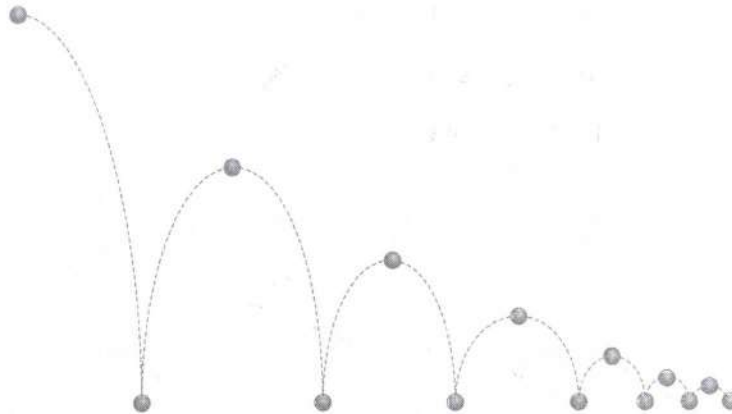


Diagram not drawn to scale

Maddox says,

Each time the ball bounces it reaches a height that is 55% of the maximum height reached on its previous bounce.

- (a) The ball is dropped from a height of 4 m.

What height will the ball reach above the ground after its 7th bounce?

[3]

$$4 \times 0.55^7 = 0.060897...$$

$$= 0.0609 \text{ m}$$

- (b) (i) State any assumptions you have made in answering part (a).

[1]

Each bounce is on the same surface

- (ii) What effect could your assumption have on your answer to part (a)?

[1]

Harder surface may bounce higher,
softer it may bounce less



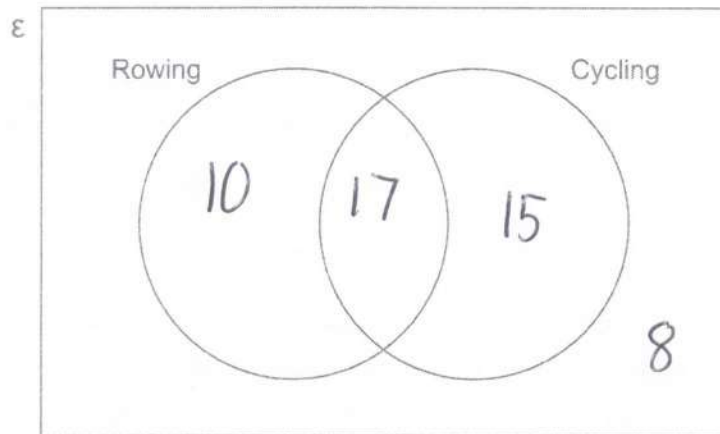
21. There are 50 people in a sports club.
Two of the sports the people can take part in are rowing and cycling.

Of these 50 people:

- 27 take part in rowing
- 32 take part in cycling
- 8 do not take part in rowing or cycling.

- (a) Complete the Venn diagram to show this information.

[2]



- (b) One person is chosen at random from the sports club.
Find the probability that they take part in rowing but not in cycling.

[2]

$$\frac{10}{50} = \frac{1}{5}$$



22. Abdul is travelling from the UK to Brazil for a holiday.
Abdul has £825 to exchange for Brazilian reais (R\$).
The exchange rate is £1 = 6.27R\$.
The bank Abdul uses to exchange his money only has 50R\$ notes.

What is the maximum amount of Brazilian reais Abdul can buy and what will this cost him in pounds?

Give your answer correct to the nearest penny.

You must show all your working.

[5]

$$£825 \times 6.27 = 5172.75$$

$$\text{nearest } 50 = 5150$$

$$= \underline{103 \text{ notes}}$$

$$\text{Cost} = \frac{5150}{6.27} = 821.371...$$

$$= \underline{£821.37}$$

23. Make R the subject of the formula $P = \sqrt[3]{RQ}$.

[2]

$$P^3 = RQ$$

$$\frac{P^3}{Q} = R$$

END OF PAPER

