



model answers

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

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Forename(s)

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Candidate signature

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# GCSE MATHEMATICS

# F

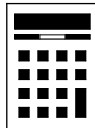
Foundation Tier      Paper 3 Calculator

Wednesday 8 November 2017      Morning      Time allowed: 1 hour 30 minutes

## Materials

For this paper you must have:

- a calculator
- mathematical instruments.



## Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

## Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

For Examiner's Use

Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
24–25	
<b>TOTAL</b>	

## Advice

- In all calculations, show clearly how you work out your answer.



N 0 V 1 7 8 3 0 0 3 F 0 1

Answer **all** questions in the spaces provided

1 Circle the cube number.

[1 mark]

100      1000      10 000      100 000

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

2 A fair ordinary dice is thrown once.

Circle the probability of getting a 2 or a 3

numbers on a dice : 1, 2, 3, 4, 5, 6

$$P(2,3) = \frac{2}{6}$$

[1 mark]

$\frac{1}{6}$        $\frac{2}{6}$        $\frac{3}{6}$        $\frac{5}{6}$

3 Circle the decimal that is greater than  $\frac{1}{5}$  and less than  $\frac{1}{4}$

$$= 0.2$$

$$= 0.25$$

[1 mark]

0.152      0.200      0.215      0.251



4 What is a **litre** a unit of?

Circle your answer.

[1 mark]

area

density

mass

capacity

5 2.5 kg of carrots cost £1.70

Work out the cost of 3.25 kg of carrots.

[3 marks]

$$\begin{array}{l} \div 2.5 \left( \begin{array}{l} 2.5 \text{ kg} = \text{£} 1.70 \\ 1 \text{ kg} = \text{£} 0.68 \end{array} \right) \div 2.5 \end{array}$$

$$3.25 \text{ kg weighs } \text{£} 0.68 \times 3.25 = \text{£} 2.21$$

Answer £ 2.21

Turn over for the next question



6 Gina makes a sandwich using

bread (B) or a roll (R)

and

ham (H) or cheese (C)

and

salad (S) or pickle (P)

6 (a) List **all** the possible types of sandwich Gina could make.  
One has been done for you.

[2 marks]

B H S      R H S      B C S      R C S  
B H P      R H P      B C P      R C P

6 (b) What **fraction** of the possible types of sandwich have cheese **and** pickle?

[1 mark]

2 sandwiches  
contain cheese and  
pickle

Answer  $\frac{1}{4}$

total no. sandwiches = 8

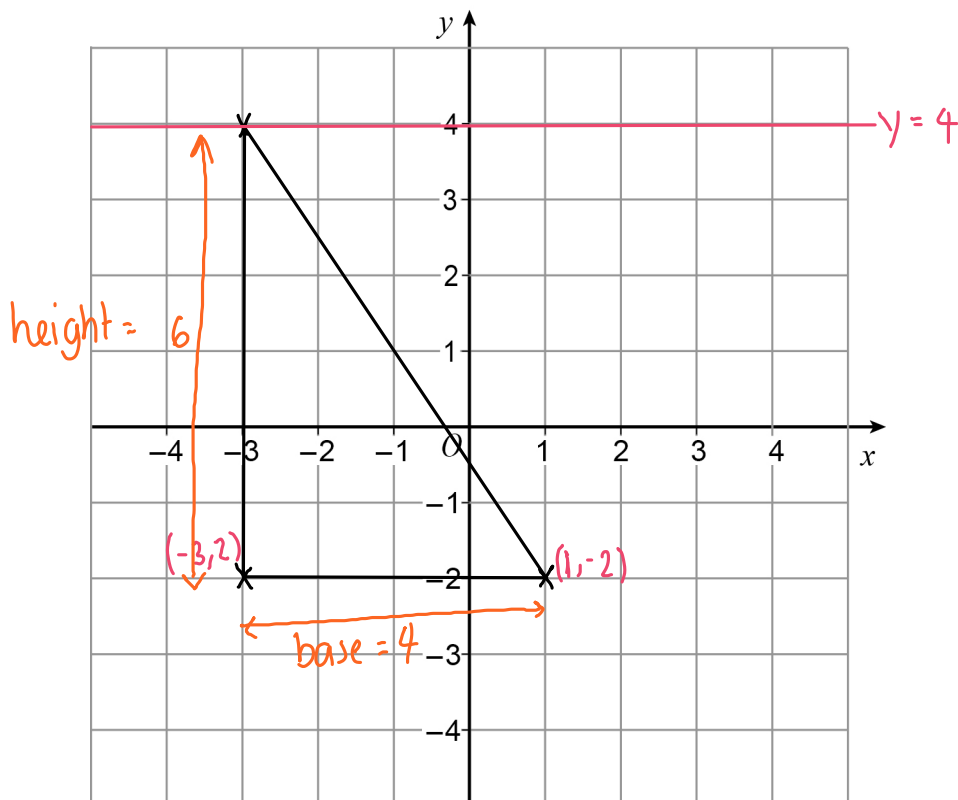
$$\text{fraction} = \frac{2}{8} = \frac{1}{4}$$



- 7  $ABC$  is a right-angled triangle.  
 A is the point  $(-3, -2)$   
 B is the point  $(1, -2)$   
 C is a point on the line  $y = 4$

7 (a) Draw triangle  $ABC$  on the centimetre grid below.

[3 marks]



7 (b) Work out the area of triangle  $ABC$ .

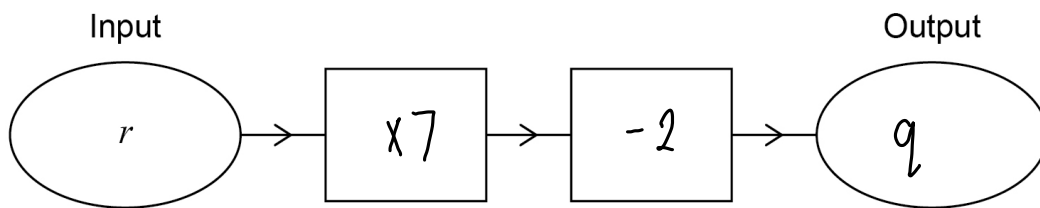
[2 marks]

area = base  $\times$  height  $\times \frac{1}{2}$   
 area =  $4 \times 6 \times \frac{1}{2} = 12 \text{ cm}^2$

Answer 12  $\text{cm}^2$

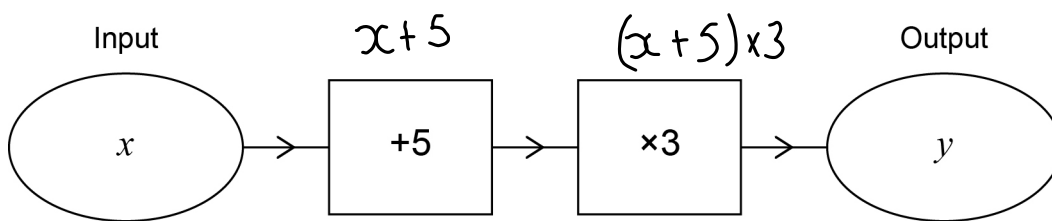


8 (a) Complete the number machine so that  $q = 7r - 2$



[2 marks]

8 (b) Write down the output  $y$  in terms of  $x$ .



[1 mark]

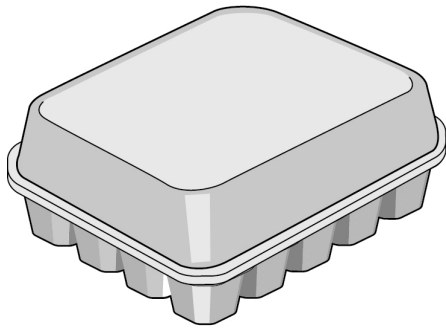
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$$3(x + 5) = y$$

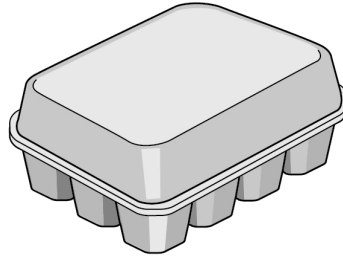
Answer  $3(x + 5) = y$



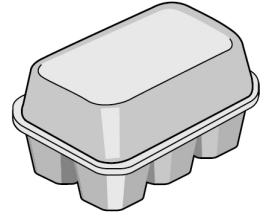
9 A farmer has 580 eggs to put into boxes.  
The boxes come in three sizes.



20 eggs



12 eggs



6 eggs

He wants

at least 10 boxes of 20 eggs

at least 15 boxes of 12 eggs

at least 25 boxes of 6 eggs.

The farmer fills 54 boxes with the 580 eggs.

Show how he does this.

[5 marks]

boxes of 20 eggs:  $10 \times 20 = 200$

boxes of 12 eggs:  $15 \times 12 = 180$

boxes of 6 eggs:  $25 \times 6 = 150$

$10 + 15 + 25 = 50$  boxes with 530 eggs ( $200 + 180 + 150$ )



leaves 4 boxes for 50 eggs

eggs:  $20 + 12 + 12 + 6 = 50$

↑  
one box of 20

↑ ↑  
two boxes of 12

↑  
one box of 6

Answer

11

boxes of 20 eggs  $10 + 1 = 11$

17

boxes of 12 eggs  $15 + 2 = 17$

26

boxes of 6 eggs  $25 + 1 = 26$

Turn over ►



10

Megan says,

“If you add any three multiples of 10 the total must be  
a multiple of 10  
**and**  
a multiple of 3”

Is she correct?

You **must** show your working.

[2 marks]

No

$$10 + 20 + 70 = 100$$

NOT<sup>↑</sup> a multiple of 3

Answer     No    





11

A fair spinner has 12 equal sections.

Label each section A, B, C or D so that when the arrow is spun,

the probability it lands on A is  $\frac{1}{6}$

the probability it lands on B is **equal** to the probability it lands on C

the probability it lands on D is **double** the probability it lands on A.

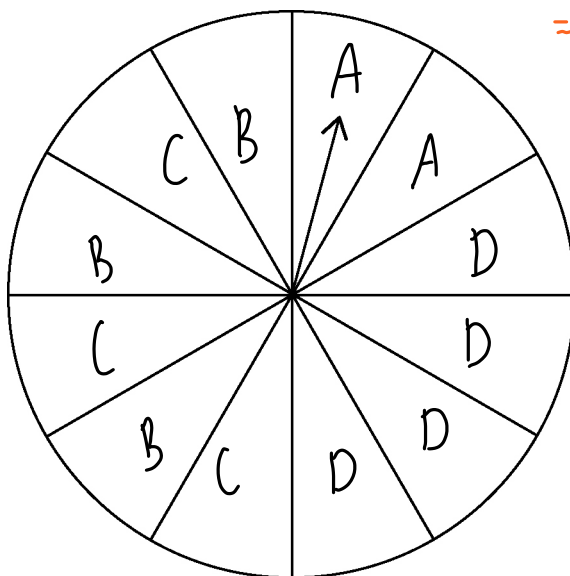
probability of A [3 marks]

$$= \frac{1}{6} = \frac{2}{12}$$

12 sections in total,  
so must be 2 As

remaining sections split equally between B and C

probability of D  
 $\frac{2}{12} \times 2 = \frac{4}{12}$



- 6 sections left  
= 3 B  
= 3 C

Turn over for the next question



12  $a - b = 5$

12 (a) Work out the value of  $2(a - b)$

[1 mark]

$$2(a - b) = 2(5) = 10$$

Answer 10

12 (b) Work out the value of  $7a - 7b$

[1 mark]

$$\begin{aligned} 7a - 7b &= 7(a - b) \\ &= 7(5) = 35 \end{aligned}$$

Answer 35

12 (c) Work out the value of  $b - a$

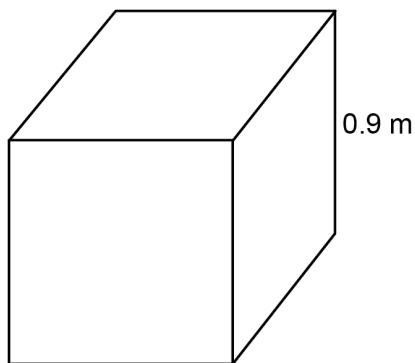
[1 mark]

$$\begin{aligned} b - a &= -(a - b) \\ &= -(5) \end{aligned}$$

Answer -5



13 A cube has edge length 0.9 metres.



Work out the **total** surface area of the cube.

Give your answer in **square centimetres**.

[3 marks]

area of one face :  $90\text{cm} \times 90\text{cm}$   
 $= 8100\text{cm}^2$

cube has 6 faces  
 $6 \times 8100 = 48600\text{cm}^2$

Answer 48600  $\text{cm}^2$

Turn over for the next question



14 £1700 is invested for 3 years at 4% per year **simple** interest.

Work out the total interest.

[3 marks]

$$1700 \times 0.04 = 68$$

£68 gained each year

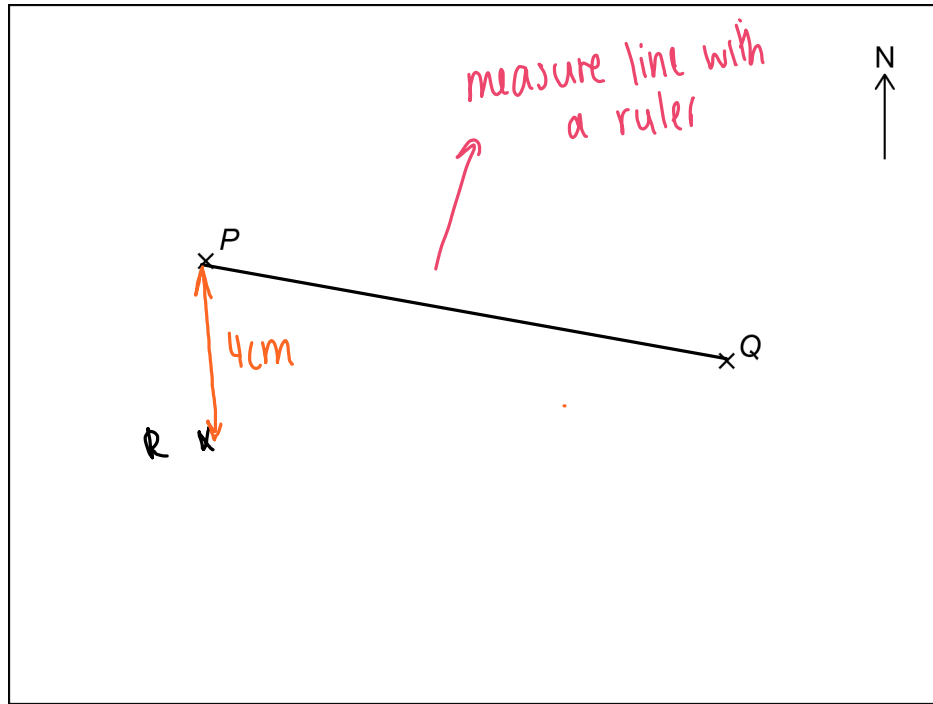
$$£68 \times 3 = £204 \text{ total interest}$$

Answer £ 204



15 Here is a map showing two towns, *P* and *Q*.

Scale: 1 cm represents 50 km



15 (a) Work out the **actual** distance between towns *P* and *Q*.

[2 marks]

$1 \text{ cm} = 50 \text{ km}$   
 $7 \text{ cm} = 350 \text{ km}$

Answer 350 km

15 (b) Town *R* is 200 km due South of town *P*.

Mark *R* on the map.

↓ directly below

[2 marks]

7

Turn over ►



16

A train has 1 first-class carriage and 6 standard carriages.

The first-class carriage has 64 seats.

 $\frac{3}{8}$  are being used.

seats used in first class:

$$64 \times \frac{3}{8} = 24$$

Each standard carriage has 78 seats.

 $\frac{7}{13}$  in each carriage are being used.

standard seats used:

$$78 \times \frac{7}{13} = 42 \text{ per carriage}$$

Are **more than** half the seats on the train being used?You **must** show your working.

$$42 \times 6 = 252 \text{ total}$$

[5 marks]

$$\text{total seats used} = 24 + 252 = 276$$

$$\begin{aligned} \text{total seats} &= 64 + (6 \times 78) \\ &= 532 \end{aligned}$$

$$\frac{276}{532} = 0.519 > 0.5$$

so, more than  $\frac{1}{2}$  seats usedAnswer Yes

17 Circle the equation which has the solution  $x = 6$

[1 mark]

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

$$x = \frac{3+x}{2}$$

$$3x = 36$$

$$\frac{x}{6} = 0$$

$$6 - 3 = \frac{6}{2}$$

$$3 = 3$$

18  $x$  is greater than 5 **and** less than or equal to 9  
Circle the inequality that shows this.

[1 mark]

$$5 \leq x < 9$$

$$5 > x \geq 9$$

$$5 \leq x > 9$$

$$5 < x \leq 9$$

Turn over for the next question



19 The following data comes from a large sample survey of the audience at a concert.

	Percentage	Mean age (years)	Age range (years)
Male	17%	20.3	6
Female	83%	25.7	28

Make **three** comparisons of males and females at the concert.  
Use the headings given.

[3 marks]

Proportion of the audience more females than males

Average age average age of men is lower

Spread of ages ages of females are more spread out





20

In a tennis tournament,

98 players took part in the singles only

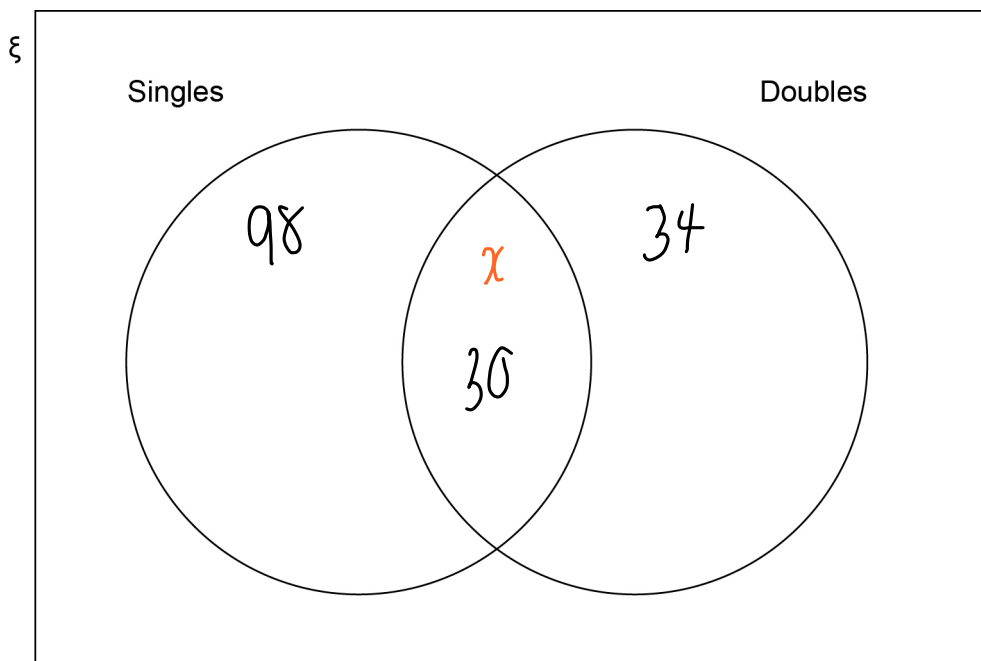
34 players took part in the doubles only

twice as many players took part in the singles as took part in the doubles.

How many players took part in both the singles **and** the doubles?

You may use the Venn diagram to help you.

[4 marks]



Singles :  $98 + x$   
 doubles :  $34 + x$

$$98 + x = 2(34 + x)$$

$$98 + x = 68 + 2x$$

$$30 = x$$

*insert into venn diagram*

Answer 30



21 The distance by road from Newport to London is 140 miles.

Tom travels by coach from Newport to London.  
The coach leaves Newport at 1.30 pm

21 (a) He assumes the coach will travel at an average speed of 50 mph

Use his assumption to work out the arrival time in London.

[3 marks]

$$\text{Speed} = \frac{\text{distance}}{\text{time}}, \quad t = \frac{d}{s}$$

$$t = \frac{140}{50} = 2.8 \text{ hrs}$$

$$0.8 = \frac{4}{5}$$

$$\frac{4}{5} \times 60 \text{ mins} = 48 \text{ mins}$$

$$1:30 \xrightarrow{+2\text{hr}} 3:30 \xrightarrow{+48\text{mins}} 4:18 = 2 \text{ hr } 48 \text{ mins}$$

Answer 4:18 pm

21 (b) In fact, the coach has a lower average speed.

How does this affect the arrival time?

[1 mark]

lower speed, so takes longer to get there  
∴ later arrival time

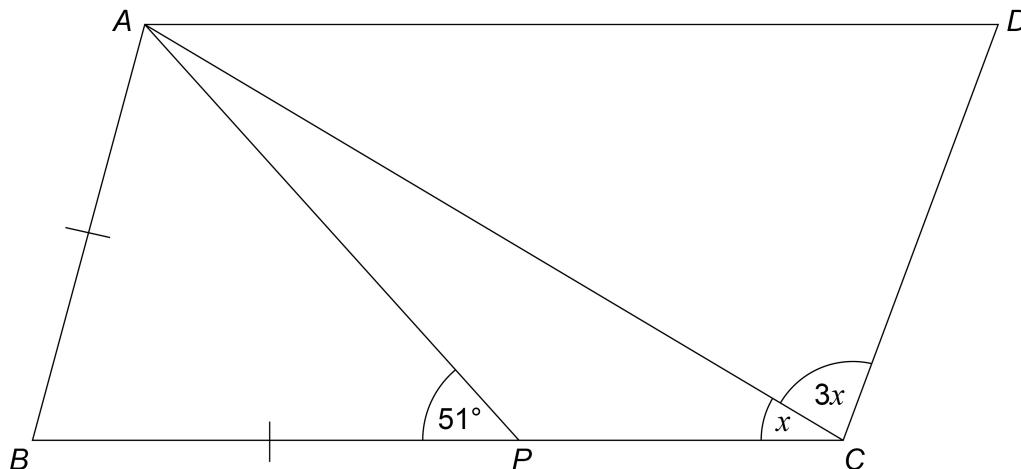


22

$ABCD$  is a parallelogram.

$AB = BP$

Not drawn  
accurately



Work out the size of angle  $x$ .

[4 marks]

$\angle PAB = 51^\circ$  base angles in an isosceles are equal

---

$\angle ABP = 180 - 51 - 51 = 78^\circ$  angles in a triangle sum 180

---

$\angle BCD = 180 - 78 = 102$  interior angles equal 180

---

$x + 3x = 102$

---

$4x = 102$

---

$x = 25.5^\circ$

Answer 25.5 degrees

Turn over for the next question



23 Show that 268 can be written as the sum of a power of 3 and a square number.

[2 marks]

powers of 3:  $3^1 = 3$   
 $3^2 = 9$

square numbers :  
1, 4, 9, 16, 25, 36

$3^3 = 27$

$3^4 = 81$

$3^5 = 243$

$243 + 25 = 268$

Answer \_\_\_\_\_



24  $y$  is inversely proportional to  $x$  and  $k$  is a constant.

Circle the correct equation.  $y \propto \frac{1}{x}$ ,  $y = \frac{k}{x}$

[1 mark]

$y = \frac{k}{x}$

$y = kx$

$y = \frac{x}{k}$

$y = x - k$

25

pressure =  $\frac{\text{force}}{\text{area}}$

force = pressure  $\times$  area

$F = 24 \times 3$

$= 72 \text{ N}$

Work out the **force** when the pressure is  $24 \text{ N/m}^2$  and the area is  $3 \text{ m}^2$   
Circle your answer.

[1 mark]

0.125 N

8 N

27 N

72 N

Turn over for the next question

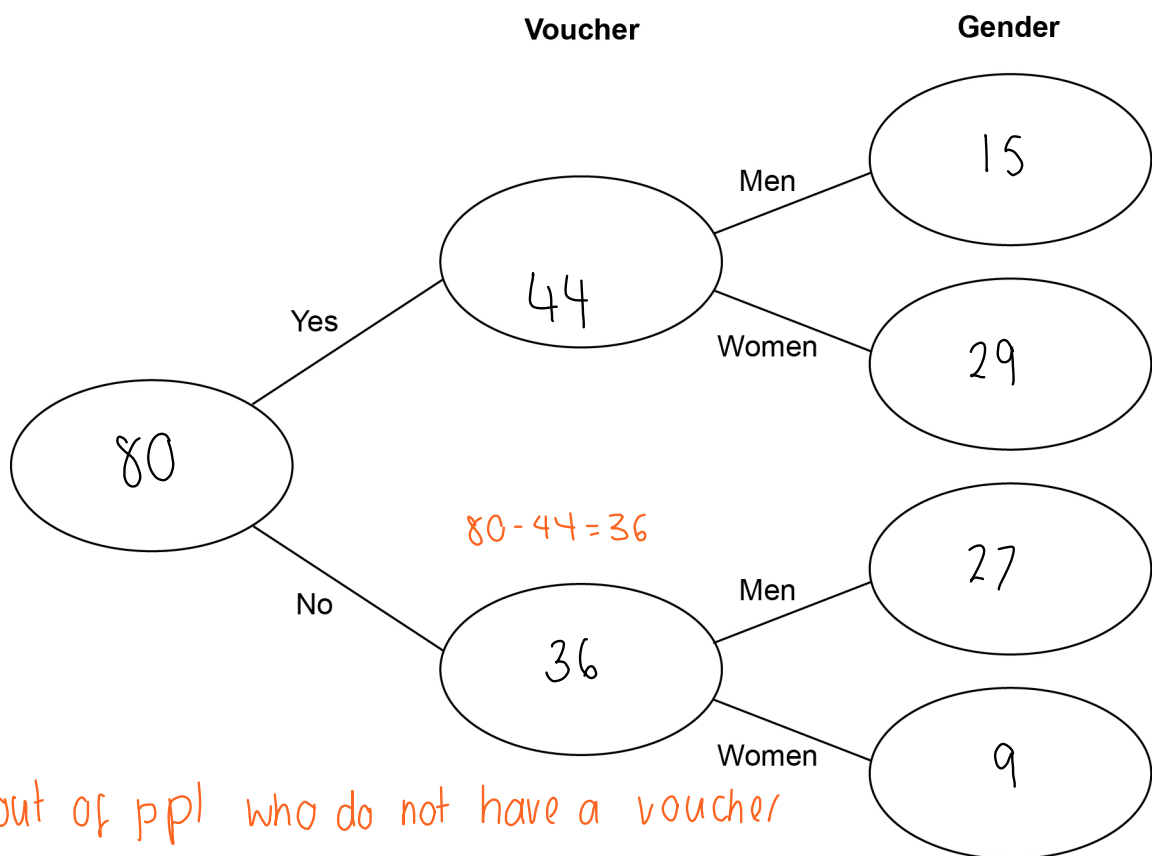


- 26 42 men and 38 women visit a restaurant.  
44 of these people have a voucher.  
Three times as many men as women do **not** have a voucher.

26 (a) Complete the frequency tree.

[4 marks]

$$42 + 38 = 80 \text{ ppl in total}$$



*out of ppl who do not have a voucher*

*women : men*

*1 : 3*

*9 : 27*

*women with voucher : 38 - 9 = 29*

*men with voucher : 42 - 27 = 15*



**26 (b)** A voucher takes **15% off** the bill.  
After using the voucher, the bill for a meal is £27.20  
How much was the bill before using the voucher?

[3 marks]

$$\begin{aligned} 100 - 15 &= 85\% \\ 85\% &= \text{£} 27.20 \\ \div 85 & \quad \times 100 \\ 1\% &= \text{£} 0.32 \\ \times 100 & \\ 100\% &= \text{£} 32 \end{aligned}$$

Answer £ 32

Turn over for the next question



27 (a) Rearrange  $v = u + at$  to make  $t$  the subject of the formula.

[2 marks]

$$v = u + at$$

$$v - u = at$$

$$\frac{v - u}{a} = t$$

Answer  $\frac{v - u}{a} = t$

27 (b) Complete this table with consistent metric units.

[2 marks]

Distance	Time	Speed	Acceleration
m	s	m/s	m/s <sup>2</sup>





28

Multiply out and simplify  $(x - 8)^2$

[2 marks]

$$= (x - 8)(x - 8)$$

$$= x^2 - 8x - 8x + 64$$

$$= x^2 - 16x + 64$$

Answer  $x^2 - 16x + 64$

END OF QUESTIONS



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