



**GCSE  
Mathematics  
Specification (8300/1F)**

**F**

Paper 1 Foundation tier

Date

Morning

1 hour 30 minutes

**Materials**

For this paper you must have:

- mathematical instruments

You must **not** use a calculator



**Instructions**

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the bottom of this page.
- 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.
- In all calculations, show clearly how you work out your answer.

**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.

Please write clearly, in block capitals, to allow character computer recognition.

Centre number

Candidate number

Surname

Forename(s)

Candidate signature \_\_\_\_\_

Answer all questions in the spaces provided.

- 1 How many centimetres are there in 3.7 metres?  
Circle your answer.

[1 mark]

0.037

0.37

37

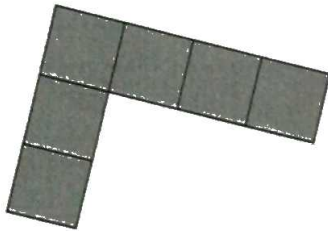
370

$$1\text{m} = 100\text{cm}, \quad 3.7 \times 100 = 370\text{cm}$$

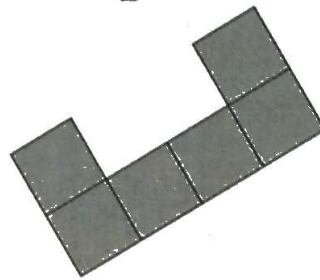
- 2 Which of these is the net of a cube?  
Circle the correct letter.

[1 mark]

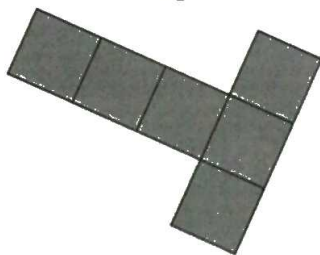
A



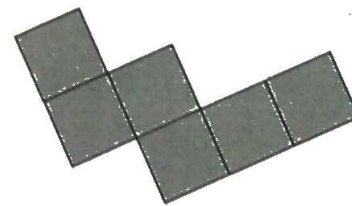
B



C



D



- 3 Circle the fraction that is **not** equivalent to  $\frac{3}{8}$

[1 mark]

$\frac{6}{16}$

$\frac{9}{24}$

$\frac{12}{32}$

$\frac{15}{35}$

$$\frac{15}{35} \left( \div \frac{5}{5} \right) = \frac{3}{7} \neq \frac{3}{8}$$

- 4 Simplify  $5a - (2a + 6)$   
Circle your answer.

[1 mark]

$3a + 6$

$9a$

$-3a$

$3a - 6$

$$\begin{aligned} 5a - (2a + 6) &= 5a - 2a - 6 \\ &= 3a - 6 \end{aligned}$$

Turn over for the next question

5 Complete the table.

[2 marks]

$$1 \text{ hr} = 60 \text{ mins}$$

$$\frac{40}{60} = \frac{2}{3}$$

Minutes	Hours
30	$\frac{1}{2}$
40	$\frac{2}{3}$
135	$2\frac{1}{4}$

$$2\frac{1}{4} \times 60$$

$$= (60 \times 2) + (60 \times \frac{1}{4})$$

$$= 120 + 15$$

$$= 135$$

6 Here are some numbers.

9.6

12.6

15.4

7.6

12.4

17.4

Write the numbers in pairs so that the sum of the numbers in each pair is the same.

[2 marks]

IN ORDER: ① 7.6, ② 9.6, ③ 12.4, ③ 12.6, ② 15.4, ① 17.4

FOR PAIRS TO SUM TO SAME AMOUNT, WE MUST

PAIR SMALLEST WITH LARGEST:

$$\textcircled{1} 7.6 + 17.4 = 25$$

$$\textcircled{2} 9.6 + 15.4 = 25$$

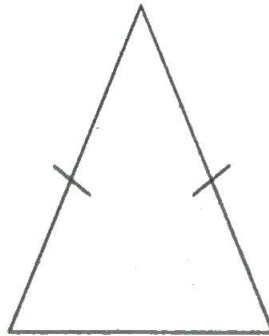
$$\textcircled{3} 12.4 + 12.6 = 25$$

Answer 7.6 and 17.4

9.6 and 15.4

12.4 and 12.6

7 This triangle is drawn accurately.



What type of triangle is it?

Tick two boxes.

[1 mark]

acute-angled

obtuse-angled

equilateral

isosceles

scalene

Turn over for the next question

8

Work out 51% of 400

[2 marks]

$$50\% \text{ of } 400 = 400 \div 2 = 200$$

$$1\% \text{ of } 400 = 400 \div 100 = 4$$

$$\therefore 51\% \text{ of } 400 = 200 + 4 = 204$$

Answer

204

9

Write 180 g as a fraction of 3 kg

Give your answer in its simplest form.

[2 marks]

$$3 \text{ kg} = 3000 \text{ g}$$

$$\frac{180}{3000} = \frac{3}{50}$$

Answer

 $\frac{3}{50}$

10 Here are some properties of numbers.

- A Even
- B Odd
- C Prime
- D Square
- E Two-digit

10 (a) Which **two** properties does the number 4 have?

Circle the correct letters.

[1 mark]

A                      B                      C                      D                      E

10 (b) Can one number have **all** of the properties?

Tick a box.

Yes

No

Cannot tell

Give a reason for your answer.

[1 mark]

A NUMBER CANNOT BE BOTH ODD AND  
EVEN

10 (c) Write down a number with **three** of the properties.

State which properties it has.

[2 marks]

13 is ODD, PRIME, and TWO-DIGIT

Number 13

Properties B, C, E

11

Ranjit has six coins in his pocket.

If he picks **five** of the coins

the most he could pick is £4.60

the least he could pick is £2.70

How much money does he have altogether?

[4 marks]

$$\text{DIFFERENCE: } £4.60 - £2.70 = £1.90$$

SO, WHEN PICKING £4.60 HE MUST PICK A  
 £2 COIN, WHICH IS THEN SWAPPED FOR  
 A 10p COIN WHEN HE PICKS £2.70,  
 BECAUSE THIS GIVES THE DIFFERENCE OF £1.90

$$\therefore \text{TOTAL} = £4.60 + 10p \\ = £4.70$$

Answer £ 4.70



12

Here are three expressions.

$$\frac{b}{a}$$

$$a - b$$

$$ab$$

When  $a = 2$  and  $b = -6$  which expression has the smallest value?

You must show your working.

[2 marks]

$$\frac{b}{a} = \frac{-6}{2} = -3, \quad a - b = 2 - (-6) = 2 + 6 = 8$$

$$ab = 2 \times -6 = -12$$

Answer

 $ab$ 

Turn over for the next question

- 13 The table shows the ratio of teachers to children needed for two activities.

	teachers : children
Climbing	1 : 4
Walking	1 : 9

- 13 (a) There are 7 teachers to take children climbing.

What is the greatest number of children that can go climbing?

[1 mark]

$$1:4 = 7:28$$

Answer 28

- 13 (b) 49 children want to go walking.

What is the smallest number of teachers needed?

[1 mark]

$$1:9 = 6:54 \quad (5:45 \text{ NOT BIG ENOUGH})$$

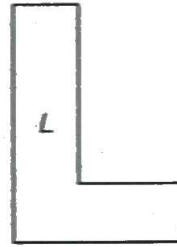
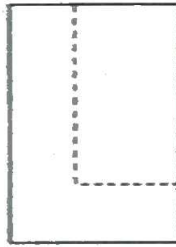
Answer 6

14

Shape  $R$  is a rectangle.

A smaller rectangle is cut from  $R$  to form shape  $L$ .

Not drawn  
accurately



Which one of these statements is true?

Tick a box.

[1 mark]

The perimeter of  $R$  is longer than the perimeter of  $L$

The perimeter of  $R$  is the same as the perimeter of  $L$

The perimeter of  $R$  is shorter than the perimeter of  $L$

It is not possible to tell which perimeter is longer

Turn over for the next question

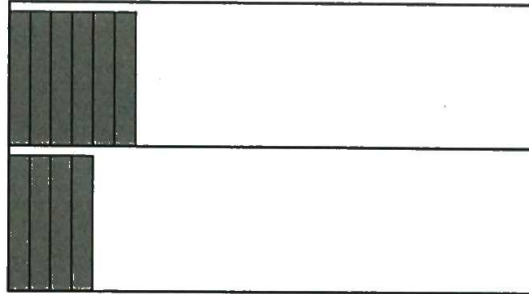
Turn over ▶  
83001F

15

Textbooks are stored on two shelves.

Each shelf is 0.72 metres long.

Each textbook is 30 millimetres wide.

Not drawn  
accurately

Can 50 textbooks be stored on these shelves?

You **must** show your working.

[3 marks]

$$1\text{m} = 1000\text{mm}, \quad 0.72 \times 1000 = 720\text{mm}$$

$$720 \div 30 = 72 \div 3 = 24$$

TWO SHELVES, SO  $24 \times 2 = 48$ ,  $\therefore$  WE CANNOT  
FIT 50 TEXTBOOKS ON.

Answer NO

16

All tickets for a concert are the same price.

Amy and Dan pay £63 altogether for some tickets.

Amy pays £24.50 for 7 tickets.

How many tickets does Dan buy?

$$\begin{array}{r} 03.5 \\ 7 \overline{) 24.5} \end{array}$$

[4 marks]

$$24.5 \div 7 = \text{£}3.50 \leftarrow \text{COST OF ONE TICKET}$$

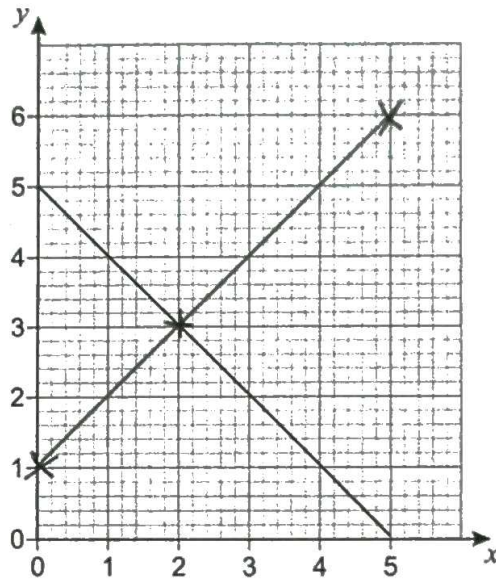
$$\text{DAN SPENDS } 63 - 24.5 = \text{£}38.50$$

$$\text{NUMBER OF TICKETS} = 38.5 \div 3.5 = 385 \div 35$$

$$\begin{array}{r} 011 \\ 35 \overline{) 385} \\ \underline{35} \phantom{0} \\ 35 \\ \underline{35} \\ 0 \end{array} = 11$$

Answer 11

- 17 Here is the graph of  $y = 5 - x$  for values of  $x$  from 0 to 5



- 17 (a) On the same grid, draw the graph of  $y = x + 1$  for values of  $x$  from 0 to 5

[2 marks]

$$x = 0, y = 1 : (0, 1)$$

$$x = 2, y = 3 : (2, 3)$$

$$x = 5, y = 6 : (5, 6)$$

STRAIGHT LINE

- 17 (b) Use the graphs to solve the simultaneous equations

$$y = 5 - x \text{ and } y = x + 1$$

[1 mark]

THE LINES CROSS

AT  $(2, 3)$

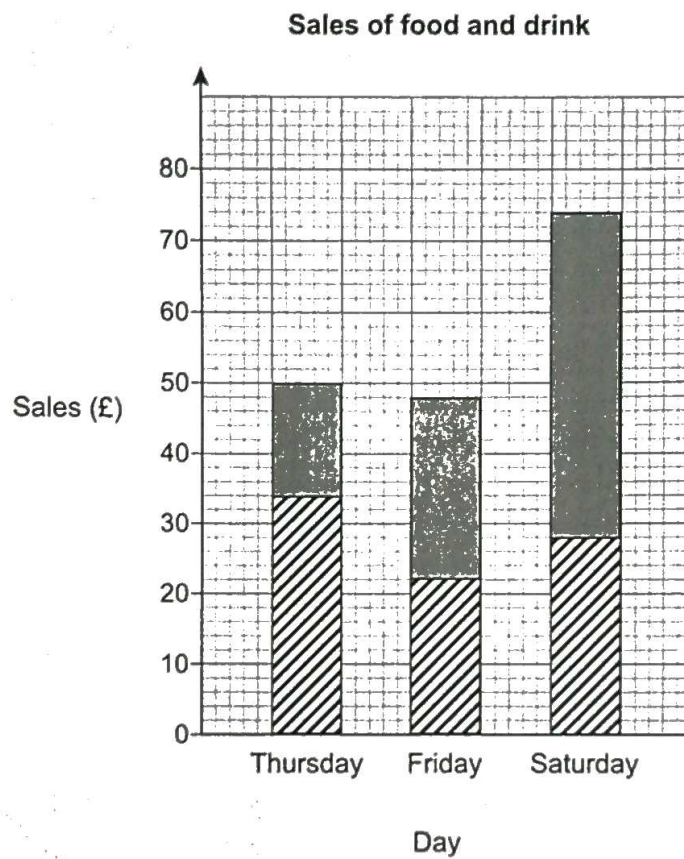
$$x = \underline{\quad 2 \quad}$$

$$y = \underline{\quad 3 \quad}$$

- 18 The table shows the sales of food and drink for three days at a market stall.

Day	Sales of food (£)	Sales of drink (£)
Thursday	34	16
Friday	22	48
Saturday	46	28

Hannah uses this information to draw a composite bar chart.



Write down three different mistakes that she has made.

[3 marks]

Mistake 1 NO KEY TO EXPLAIN WHICH BAR IS  
FOOD AND WHICH IS DRINK

Mistake 2  $22 + 48 = 70$ , SO FRIDAY'S BAR IS  
NOT TALL ENOUGH

Mistake 3 SATURDAY'S FOOD AND DRINK BARS  
ARE THE WRONG WAY ROUND

19

Sam wants to buy a camera for £345

He has already saved £96

Each week

his pay is £80

he saves 30% of this pay.

How many more weeks must he save?

[4 marks]

HE NEEDS  $345 - 96 = £249$  MORE.

30% of 80 =  $(80 \div 10) \times 3 = £24$ , SO

HE SAVES £24 EACH WEEK.

HE MUST SAVE FOR  $249 \div 24 = 11$  MORE WEEKS

$$\begin{array}{r} 010.3 \dots \\ 24 \overline{) 249.00} \end{array}$$

GREATER THAN

10, SO 11 WEEKS

Answer

11

weeks

20 (a)  $w$  and  $x$  are whole numbers.

$$w > 40$$

$$x < 30$$

Work out the **smallest** possible value of  $w - x$

[2 marks]

WANT SMALLEST  $w$  AND BIGGEST  $x$ .

$$\therefore w = 41, \quad x = 29, \quad \text{so } w - x = 12$$

Answer 12

20 (b)  $y$  and  $z$  are whole numbers.

$$y < 60$$

$$z \leq 50$$

Work out the **largest** possible value of  $y + z$

[2 marks]

WANT LARGEST  $y$  and  $z$ .

$$y = 59, \quad z = 50, \quad \text{so } y + z = 109$$

Answer 109



21 (a) Work out  $2.4 \times 0.002$

[1 mark]

$$24 \times 2 = 48, \quad 48 \div 10,000 = 0.0048$$

Answer 0.0048

21 (b) Write  $1.2 \times 10^{-5}$  as an ordinary number.

[1 mark]

$$1.2 \times 10^{-5} = 1.2 \div 100,000 = 0.000012$$

Answer 0.000012

21 (c) Write 2 500 000 in standard form.

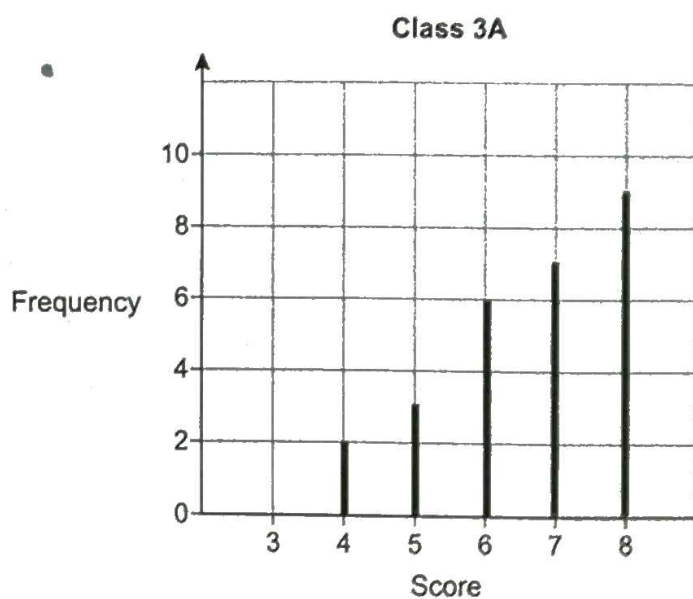
[1 mark]

$$2,500,000 = 2.5 \times 1,000,000 = 2.5 \times 10^6$$

Answer  $2.5 \times 10^6$

Turn over for the next question

- 22 The diagram shows information about the scores of Class 3A in a spelling test.



- 22 (a) A student is chosen at random from Class 3A.

Work out the probability that the student's score was the **mode** for the class.

[3 marks]

$$\text{MODE} = 8, \quad \text{TOTAL} = 2 + 3 + 6 + 7 + 9 = 27$$

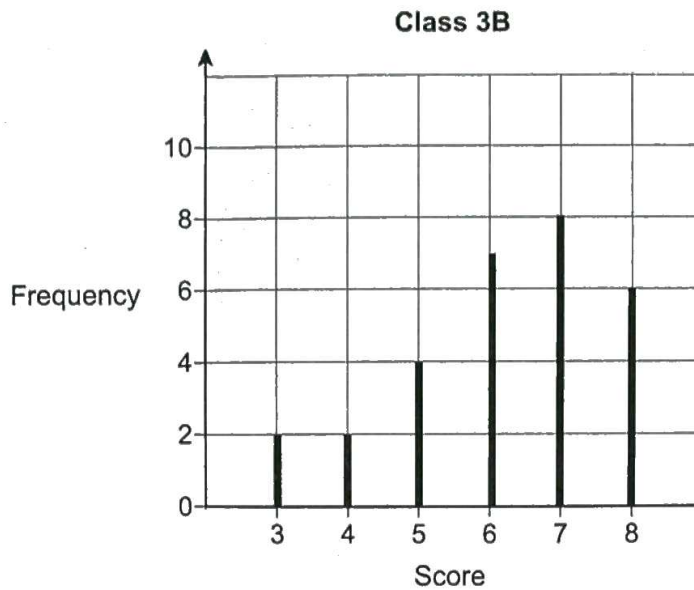
(9 STUDENTS)

$$\text{SO, PROBABILITY} = \frac{9}{27} = \frac{1}{3}$$

Answer

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

The diagram shows information about the scores of Class 3B in the same test.



- 22 (b) Show that Class 3A had more **consistent** scores than Class 3B.

Use the data from both diagrams.

[2 marks]

$$\text{RANGE OF 3A} = 8 - 4 = 4$$

$$\text{RANGE OF 3B} = 8 - 3 = 5$$

3A HAS SMALLER RANGE, SO IS MORE CONSISTENT

- 22 (c) Lucy is one of the 29 students in **Class 3B**.

Her score was the same as the **median** score for her class.

Work out her score.

[2 marks]

$$(29 + 1) \div 2 = 15, \text{ so MEDIAN IS } 15^{\text{th}} \text{ VALUE,}$$

WHICH IS 6.

Answer

6

23

Kelly is trying to work out the two values of  $w$  for which  $3w - w^3 = 2$

Her values are 1 and -1

Are her values correct?

You must show your working.

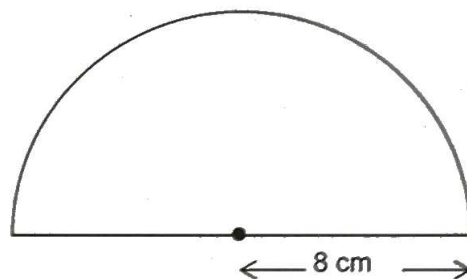
[2 marks]

$$w = 1: (3 \times 1) - 1^3 = 3 - 1 = 2, \text{ CORRECT}$$

$$w = -1: (3 \times -1) - (-1)^3 = -3 + 1 = -2, \\ \text{INCORRECT}$$

24

The diagram shows a semicircle of radius 8 cm



Not drawn accurately

Work out the area of the semicircle.

Give your answer in terms of  $\pi$ .

[2 marks]

$$\text{AREA OF CIRCLE} = \pi \times r^2 = \pi \times 8^2 = 64\pi$$

$$\text{AREA OF SEMICIRCLE} = \frac{64\pi}{2} = 32\pi$$

Answer  $32\pi$   $\text{cm}^2$

25 Work out  $2\frac{3}{4} \times 1\frac{5}{7}$

Give your answer as a mixed number in its simplest form.

[3 marks]

$$2\frac{3}{4} = \frac{11}{4}, \quad 1\frac{5}{7} = \frac{12}{7},$$

$$\frac{11}{4} \times \frac{12}{7} = \frac{11 \times 12}{4 \times 7} = \frac{132}{28} = \frac{33}{7} = 4\frac{5}{7}$$

Answer  $4\frac{5}{7}$

26 Solve  $5x - 2 > 3x + 11$

[2 marks]

$$\begin{array}{l|l} +2 & 5x - 2 > 3x + 11 \\ & 5x > 3x + 13 \\ -3x & 2x > 13 \\ \div 2 & x > 6.5 \end{array}$$

Answer  $x > 6.5$

Turn over for the next question

27

The  $n$ th term of a sequence is  $2n + 1$ The  $n$ th term of a different sequence is  $3n - 1$ 

Work out the three numbers that are

in both sequences

and

between 20 and 40

[3 marks]

$$2n + 1: \dots, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, \dots$$

$$3n - 1: \dots, 20, 23, 26, 29, 32, 35, 38, \dots$$

$$\text{So } 23, 29, 35$$

Answer 23, 29, 35

28 White paint costs £2.80 per litre.  
 Blue paint costs £3.50 per litre.  
 White paint and blue paint are mixed in the ratio 3 : 2  
 Work out the cost of 18 litres of the mixture.

[4 marks]

WHITE : BLUE : TOTAL

$$\begin{array}{ccc} 3 & : & 2 & : & 5 \\ \downarrow \times 3.6 & & \downarrow \times 3.6 & & \downarrow \times 3.6 \\ 10.8 & : & 7.2 & : & 18 \end{array}$$

$$\frac{03.60}{5 \overline{)18.00}}$$

COST OF WHITE =  $10.8 \times 2.8 = (108 \times 28) \div 100$

	100	8	2000
20	2000	160	800
8	800	64	160
			64 + 1
			<u>3024</u>

SO COST =  $\frac{3024}{100} = £30.24$

COST OF BLUE =  $7.2 \times 3.5 = (72 \times 35) \div 100$

	70	2	2100
30	2100	60	350
5	350	10	60
			10 +
			<u>2520</u>

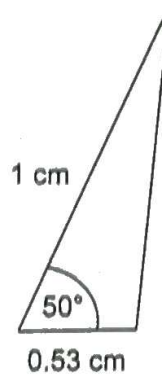
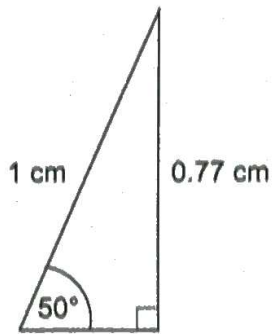
SO COST =  $\frac{2520}{100} = £25.20$

TOTAL =  $30.24 + 25.2 = 55.44$

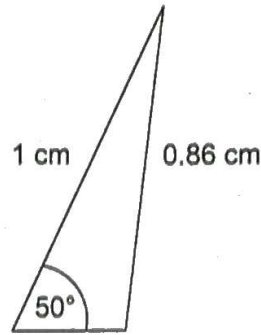
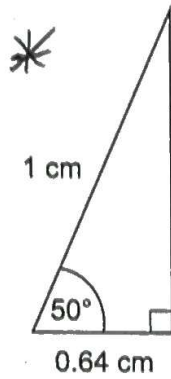
Answer £ 55.44

Turn over for the next question

29 Here are sketches of four triangles.



Not drawn accurately



In each triangle

the longest side is **exactly** 1 cm

the other length is given to 2 decimal places.

29 (a) Circle the value of  $\cos 50^\circ$  to 2 decimal places.

[1 mark]

0.77

0.53

0.64

0.86

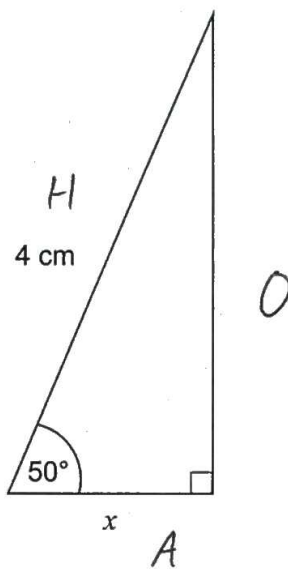
S O H C A H T O A,  $\cos x = \frac{A}{H}$

TRIANGLE \* GIVES :  $\cos 50 = \frac{0.64}{1} = 0.64$



- 29 (b) Work out the value of  $x$ .  
Give your answer to 1 decimal place.

SOHICAMT<sup>OA</sup>



Not drawn  
accurately

[2 marks]

$$\cos 50 = \frac{A}{H} = \frac{x}{4}$$

$$\therefore x = 4 \times \cos 50 = 2.6 \text{ (1 d.p.)}$$

Answer 2.6 cm

Turn over for the next question

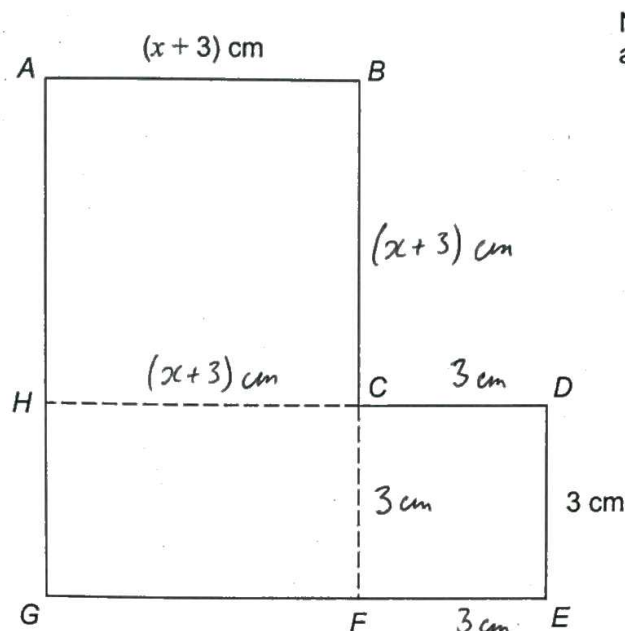
30

$ABCH$  is a square.

$HCFG$  is a rectangle.

$CDEF$  is a square.

They are joined to make an L-shape.



Not drawn accurately

Show that the total area of the L-shape, in  $\text{cm}^2$ , is  $x^2 + 9x + 27$

[4 marks]

$HC, BC = (x+3) \text{ cm}$  BECAUSE  $ABCH$  IS SQUARE

$CF, CD = 3 \text{ cm}$  BECAUSE  $CDEF$  IS SQUARE

TOTAL AREA = AREA OF  $ABCH$  + AREA OF  $HCFG$   
+ AREA OF  $CDEF$

$$\begin{aligned}
 &= (x+3)(x+3) + 3(x+3) + 3^2 \\
 &= x^2 + 3x + 3x + 9 + 3x + 9 + 9 \\
 &= x^2 + 9x + 27
 \end{aligned}$$

END OF QUESTIONS