

Expanding and factorising

Exam questions

Foundation and Higher tiers

Please write clearly in block capitals.

Name

Class

Teacher

Time allowed: 70 minutes

Materials

For this booklet you need a black pen, a pencil, a ruler, a rubber and a calculator for Section B.

Instructions

- Use black ink or black ballpoint pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer all questions in the spaces provided.
- **Section A** (questions 1 to 15): you must not use a calculator.
- **Section B** (questions 16 to 20): you may use a calculator.
- Do all rough work in this booklet. Cross through any work you do not want marked.

Information

- The marks for each question are shown in brackets.
- The maximum mark for this booklet is 63.

Advice

- Read each question carefully.
- In all calculations, show clearly how you work out your answer.

For teacher's use

Q	Mark	Q	Mark
1		11	
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	
TOTAL			

Section A



You must not use a calculator

Do not
write
outside
the box

- 1** (a) Expand $4(2y - 5)$

Answer _____

[1 mark]

- (b) Factorise $6a + 15$

Answer _____

[1 mark]

- (c) Circle the expansion of $-3(x - 4)$

$-3x - 12$ $-3x + 12$ $3x - 12$ $-3x - 4$

[1 mark]

- 2** Write a number in each box to make this true for all values of x .

$$\boxed{} (3x - \boxed{}) = 12x - 20$$

[2 marks]

- 3** Expand and simplify $3(2x + 5) - 2(x - 4)$

Answer _____

[2 marks]

- 4** (a) Expand $m(m + 7)$

Answer _____
[1 mark]

- (b) Factorise fully $12p^2 - 8p$

Answer _____
[2 marks]

- 5** Expand and simplify $(x + 6)(x - 2)$

Answer _____
[2 marks]

- 6** Mo says,
“ $(x - 5)^2$ is the same as $x^2 - 25$ ”

Is Mo correct?
You must show your working.

[2 marks]

7 Factorise $x^2 - 3x - 28$

Do not
write
outside
the box

Answer _____
[2 marks]

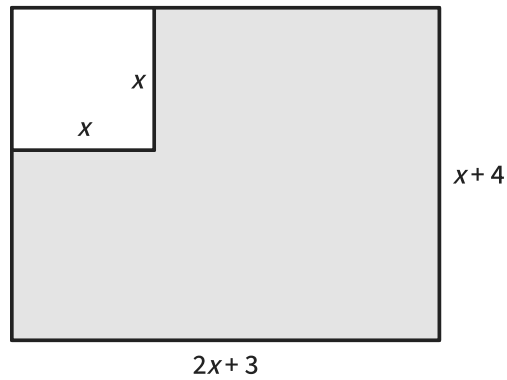
8 (a) Factorise $y^2 - 81$

Answer _____
[1 mark]

(b) Use factorising to work out $63^2 - 37^2$
You must show your working.

Answer _____
[2 marks]

- 9** The diagram shows a rectangle with a square cut from one corner. All lengths are in centimetres.



Not drawn accurately

Show that the shaded area is $x^2 + 11x + 12 \text{ cm}^2$

[3 marks]

- 10** Factorise fully $3x^2 + 6x - 45$

Answer _____

[2 marks]

Do not
write
outside
the box

Work out the values of a and b .

[2 marks]

[3 marks]

[2 marks]

- 14** Factorise fully $18x^2y - 8y^3$

Do not
write
outside
the box

Answer _____

[3 marks]

- 15** $(x + 3)(2x - 1)(x + a) \equiv 2x^3 + bx^2 + cx - 12$

Work out the values of a , b and c .

$a =$ _____ $b =$ _____ $c =$ _____

[4 marks]

Section B

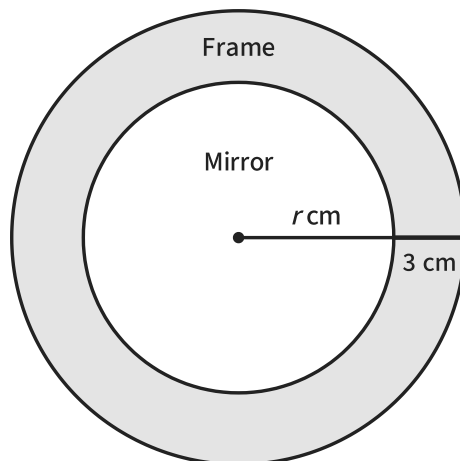


You may use a calculator

Do not
write
outside
the box

- 16** A circular mirror has radius r cm.
It sits inside a frame.
The frame is a ring 3 cm wide.

(a) Show that the area of the frame is $3\pi(2r + 3)$ cm²



Not drawn accurately

[3 marks]

- (b)** The area of the frame is 150 cm²
Work out the radius of the mirror.
Give your answer to 1 decimal place.

Answer _____ cm

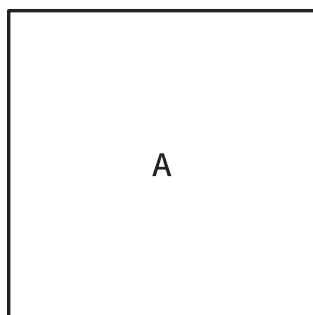
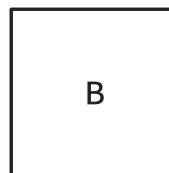
[2 marks]

17

Square A has sides of length $(x + 2.6)$ cm.

Square B has sides of length $(x - 1.4)$ cm.

The area of square A is 31.2 cm^2 more than the area of square B.

 $(x + 2.6) \text{ cm}$  $(x - 1.4) \text{ cm}$

Not drawn accurately

Work out the value of x .

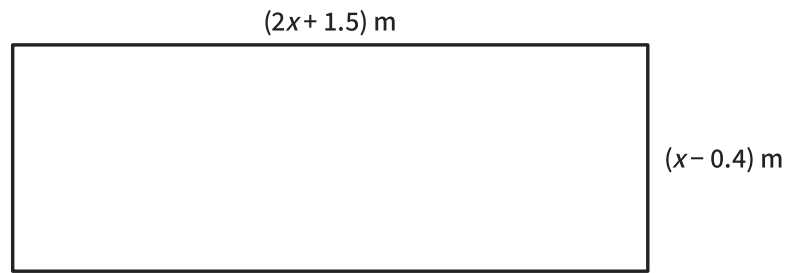
You must show your working.

Answer _____

[4 marks]

- 18** A rectangular vegetable bed is $(2x + 1.5)$ m long and $(x - 0.4)$ m wide.

- (a)** Show that the area of the bed is $2x^2 + 0.7x - 0.6 \text{ m}^2$



Not drawn accurately

[2 marks]

- (b)** The width of the bed is 2.85 m
 A bag of compost covers 2.5 m^2 of the bed.
 How many bags of compost are needed to cover the whole bed?
 You must show your working.

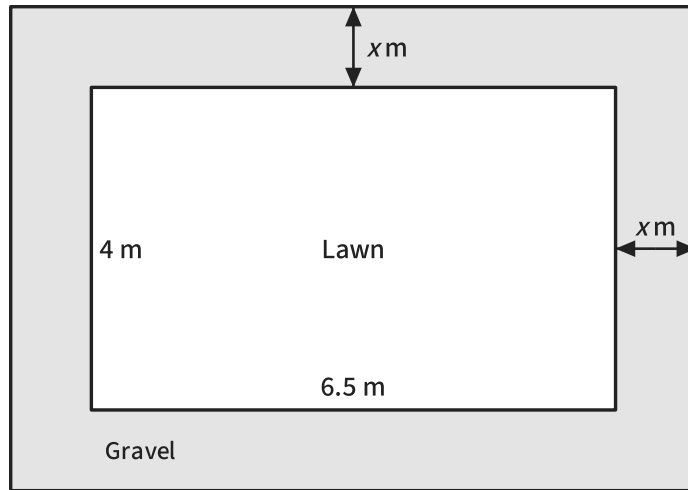
Answer _____

[3 marks]

19

A rectangular lawn is 6.5 m long and 4 m wide.
A gravel border of width x metres is laid all the way round the lawn.
The area of the gravel border is 30 m^2

(a) Show that $4x^2 + 21x - 30 = 0$



Not drawn accurately

[3 marks]

(b) Work out the width of the gravel border.
Give your answer to 2 decimal places.

Answer _____ m

[3 marks]

20

A box is a cuboid.

Its length is $(x + 3)$ cm, its width is $(x + 2)$ cm and its height is $(x + 1)$ cm.

The volume of the box is 200 cm^3

(a) Show that $x^3 + 6x^2 + 11x = 194$

[3 marks]

(b) Show that $x = 3.9$, correct to 1 decimal place.

[2 marks]

END OF QUESTIONS