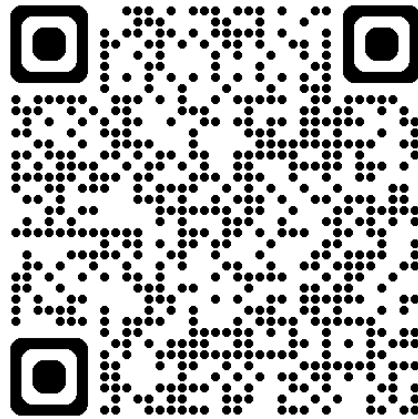




MR TOMPKINS EDTECH  
Maths and Edtech videos for students and teachers...

## Top 10 Topics for OCR Paper 2



Complete the questions first, and then use the video to mark/uplevel your work in red pen. Video link: <https://youtu.be/BXkSaGuxVvY>

### *Suitable for Foundation Tier Students*

- Algebraic expressions
  - Substitution
- Solving equations
  - Sequences
  - Percentages
    - Indices
    - Inequalities
  - Standard form
- Calculate exactly with  $\pi$

## Algebraic Expressions

**Q1.** (a) Circle the expression that is equivalent to  $4 \times x$

$x^4$        $4x$        $4^x$        $x \times x \times x \times x$

(1)

(b) Circle the expression that is equivalent to  $y \times y \times y$

$3y$        $y^2$        $3y^2$        $y^3$

(1)

(c) Circle the expression that is equivalent to  $a + b$

$b + a$        $ab$        $ba$        $2ab$

(1)

(Total 3 marks)

**Q2.** Simplify  $7x + 5 - 8 - 3x$   
Circle your answer.

$x$        $4x + 3$        $4x - 3$        $10x - 3$

(Total 1 mark)

**Q3.** (a) Simplify  $y \times y$

Answer \_\_\_\_\_

(1)

(b) Simplify  $5a + 2 - a + 9$

\_\_\_\_\_  
\_\_\_\_\_

Answer \_\_\_\_\_

(2)

(Total 3 marks)

**Q4.** Simplify  $7a + 5b + 3a - 2b$

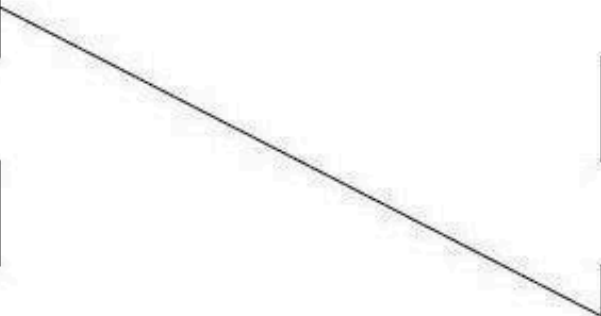
\_\_\_\_\_

Answer \_\_\_\_\_

(Total 2 marks)

**Q5.** Match each expression in Column P with the equivalent expression in Column Q.

One has been done for you.

Column P		Column Q
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"><math>a^2 \times a</math></div>		<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"><math>6a</math></div>
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"><math>2a \times 3</math></div>		<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"><math>5a</math></div>
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"><math>12a^2 \div 2</math></div>		<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"><math>a^3</math></div>
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"><math>10 \times \frac{1}{2}a^2</math></div>		<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"><math>5a^2</math></div>
		<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"><math>6a^2</math></div>

**(Total 3 marks)**

**Q6.** (a) Simplify fully  $7a + 3a - 4a$

\_\_\_\_\_

Answer \_\_\_\_\_

**(1)**

(b) Simplify fully  $3 \times m \times 2 \times p$

\_\_\_\_\_

Answer \_\_\_\_\_

**(1)**

**(Total 2 marks)**

**Q7.** Match each expression on the left with one on the right. One has been done for you.

		$4ab$
$12ab \div 4$	$4 + a$	
$a + a + a + a$	$3ab$	
$4 \times a \times b$	$4a$	
$a \times a \times a \times a$	$a^4$	
$a + a + b + b$	$2ab$	
	$2a + 2b$	

**(Total 4 marks)**

**Q8.** Simplify  $12x^2 - 8x^2 - 5x + 2x$

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Answer \_\_\_\_\_

**(Total 2 marks)**

**Q9.** Simplify fully  $(2 \times 4a) + 9 + \frac{15a}{3} - 7$

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Answer \_\_\_\_\_

**(Total 3 marks)**

## Substitution

**Q10.**  $P = 2a + 3b$

Work out the value of  $P$  when  $a = 11$  and  $b = 5$

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Answer \_\_\_\_\_

(Total 2 marks)

**Q11.** Work out the value of  $a^2 - 4a$  when  $a = 10$

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Answer \_\_\_\_\_

(Total 2 marks)

**Q12.** Work out the value of  $4(2x + 3y)$  when  $x = 8$  and  $y = -3$

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Answer \_\_\_\_\_

(Total 2 marks)

**Q13.**  $P = 2L + 3W - 6Y$

Work out the value of  $P$  when  $L = 5$ ,  $W = 4$  and  $Y = \frac{1}{2}$

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Answer \_\_\_\_\_ (Total 3 marks)

**Q14.** 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.

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Answer \_\_\_\_\_

**(Total 2 marks)**

## Solve Equations

**Q15.** Solve  $7x = 56$

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$x =$  \_\_\_\_\_

**(Total 1 mark)**

**Q16.** (a) Solve  $n + 7 = 103$

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$n =$  \_\_\_\_\_

**(1)**

(b) Solve  $\frac{m}{6} = 12$

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$m =$  \_\_\_\_\_

**(1)**

**(Total 2 marks)**

**Q17.** Solve  $25 - y = 18$

\_\_\_\_\_

$y =$  \_\_\_\_\_

**(Total 1 mark)**

**Q18.** (a) Solve  $x + 12 = 29$

\_\_\_\_\_

$x =$  \_\_\_\_\_

**(1)**

(b) Solve  $0.5y = 20$

\_\_\_\_\_

$y =$  \_\_\_\_\_

**(1)**

**(Total 2 marks)**

**Q19.** Solve  $6x - 11 = 13$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

$x =$  \_\_\_\_\_

**(Total 2 marks)**

**Q20.** Solve  $10x - 3 = 21$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

$x =$  \_\_\_\_\_

**(Total 2 marks)**

**Q21.** Solve  $\frac{x}{3} - 9 = 12$

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$x =$  \_\_\_\_\_

**(Total 2 marks)**

**Q22.** Solve  $4(x + 5) = 15$

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$x =$  \_\_\_\_\_

**(Total 3 marks)**

**Q23. (a)** Solve  $5(x - 2) = 35$

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$x =$  \_\_\_\_\_

**(3)**

**(b)** Solve  $9y + 1 = 6y + 13$

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$y =$  \_\_\_\_\_

**(3)**

**(Total 6 marks)**

## Sequences

**Q24.** The  $n$ th term of a sequence is  $5n - 2$ . Work out the 3rd term. Circle your answer.

51

5

123

13

(Total 1 mark)

**Q25.** (a) The term-to-term rule for a sequence is

add 4 then divide by 2

The 1st term of the sequence is 36. Work out the 3rd term.

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Answer \_\_\_\_\_ (2)

(b) The term-to-term rule for a different sequence is

divide by 3 then add 10

The 2nd term of this sequence is 60. Work out the 1st term.

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Answer \_\_\_\_\_ (2)

(Total 4 marks)

**Q26.** (a) The term-to-term rule of a sequence is

Add 8 and divide by 2

The first term of the sequence is  $-24$ . Work out the next two terms.

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Answer \_\_\_\_\_ and \_\_\_\_\_

(2)

(b) The term-to-term rule of a different sequence is

Subtract 1 and multiply by 5

The third term of this sequence is 120

.....                      .....                      120

Work out the first term.

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Answer \_\_\_\_\_

(2)  
(Total 4 marks)

**Q27.** (a) Here is a sequence.

5            8            11            14            17            .....

Write down the next number in the sequence.

Write down the rule for continuing the sequence.

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Next number \_\_\_\_\_

Rule \_\_\_\_\_

(2)

(b) Here is a different sequence.

Work out the  $n$ th term of the sequence.

7            13            19            25            31

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Answer \_\_\_\_\_

(2)  
(Total 4 marks)

**Q28.** Here are the first five terms of a linear sequence.

9      15      21      27      33      ...

Work out the  $n$ th term.

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Answer \_\_\_\_\_

**(Total 2 marks)**

**Q29.** Here is a linear sequence.

46      40      34      28      22      \_\_\_\_

Work out the  $n$ th term of the sequence.

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Answer \_\_\_\_\_

**(Total 2 marks)**

**Q30.** All the terms of a **geometric** progression are positive.

The second and fourth terms are shown.

.....      4      .....      16

Work out the first and third terms.

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First term \_\_\_\_\_

Third term \_\_\_\_\_

**(Total 2 marks)**

**Q31.** Match each sequence to its description. One has been done for you.

1 1 2 3 5 8	Arithmetic progression
1 2 4 8 16 32	Geometric progression
1 2 3 4 5 6	Fibonacci sequence
1 3 6 10 15 21	Triangular numbers
1 4 9 16 25 36	Cube numbers
1 8 27 64 125 216	Square numbers

(Total 4 marks)

**Q32.** The  $n$ th term of a sequence is  $12n - 5$

Work out the numbers in the sequence that

have two digits

and

are **not** prime.

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Answer \_\_\_\_\_

(Total 3 marks)

## Percentages

**Q33.** Work out 20% of 14 000

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Answer \_\_\_\_\_

**(Total 2 marks)**

**Q34.** Work out 80% of 300

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Answer \_\_\_\_\_

**(Total 2 marks)**

**Q35.** Work out 51% of 400

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Answer \_\_\_\_\_

**(Total 2 marks)**

**Q36.** (a) What is 70 out of 200 as a percentage?

Answer \_\_\_\_\_ %

**(1)**

(b) Work out 0.5% of 920

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Answer \_\_\_\_\_ (2)

**(Total 3 marks)**

**Q37.** 5% of a number is 31

1% of the same number is 6.2

Work out 13% of the number.

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Answer \_\_\_\_\_

**(Total 3 marks)**

**Q38.** 10% of 2100 is 210

Work out 43% of 2100

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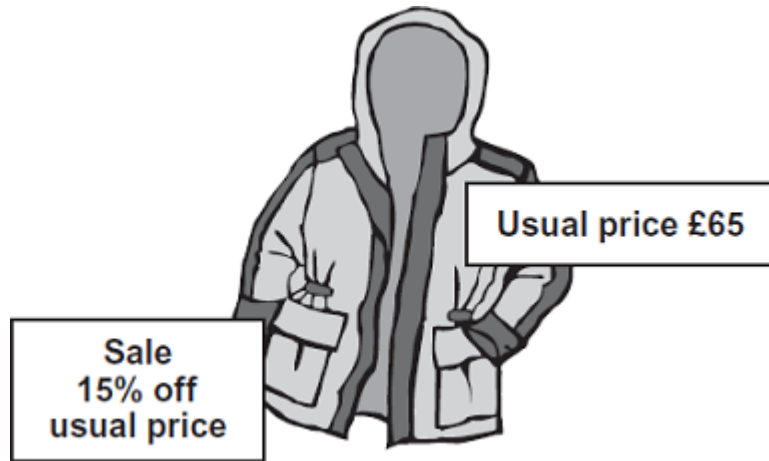
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Answer \_\_\_\_\_

**(Total 3 marks)**

**Q39.**



Work out the sale price.

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Answer £ \_\_\_\_\_

**(Total 3 marks)**

**Q40.**

Increase 6800 by 12%.

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Answer \_\_\_\_\_

**(Total 3 marks)**

## Indices

**Q41.** Simplify  $2^5 \times 2^3$

Circle your answer.

$4^8$

$2^8$

$2^{15}$

$4^{15}$

(Total 1 mark)

**Q42.** Simplify

$(5^4)^2$

Circle your answer.

$5^6$

$5^8$

$25^6$

$25^8$

(Total 1 mark)

**Q43. (a)** Simplify  $a^{20} \times a^5$

Answer \_\_\_\_\_ (1)

(b) Simplify  $\frac{a^{20}}{a^5}$

Answer \_\_\_\_\_ (1)

(c) Simplify  $(a^{20})^5$

Answer \_\_\_\_\_ (1)

(Total 3 marks)

**Q44.** Work out

$\frac{3^{12}}{3^7}$

Give your answer as a whole number.

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Answer \_\_\_\_\_ (Total 2 marks)

**Q45.** Work out the value of  $(3^{12} \div 3^5) \div (3^2 \times 3)$

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Answer \_\_\_\_\_

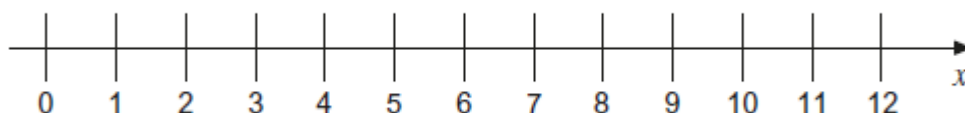
**(Total 3 marks)**

## Inequalities

**Q46.** (a) Write down **all** the integers that satisfy  $-3 \leq n < 2$

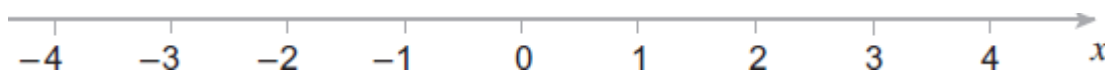
\_\_\_\_\_   
 Answer \_\_\_\_\_ (1)

(b) Show  $2 < x \leq 10$  on the number line.



(2)   
 (Total 3 marks)

**Q47.** (a) Show the inequality  $x > -2$  on the number line.



(1)

(b) Solve the inequality  $3x + 5 \leq 11$

\_\_\_\_\_  
\_\_\_\_\_

Answer \_\_\_\_\_ (2)

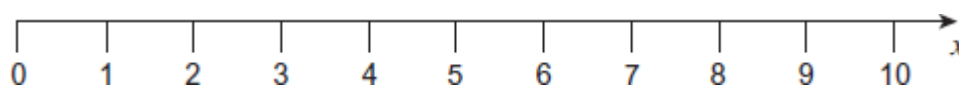
(Total 3 marks)

**Q48.** (a) Solve  $4x - 7 \leq 13$

\_\_\_\_\_  
\_\_\_\_\_

Answer \_\_\_\_\_ (2)

(b) Show  $3 < x \leq 8$  on the number line.



(2)   
 (Total 4 marks)

**Q49.** Solve  $5(x + 3) < 60$

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Answer \_\_\_\_\_

**(Total 2 marks)**

**Q50.** Solve  $5x + 6 > 3x + 15$

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Answer \_\_\_\_\_

**(Total 3 marks)**

## Standard Form

**Q51.** Circle the number that is written in standard form.

$0.9 \times 10^{-3}$

$6 \times 10^{0.5}$

$5.2 \times 10^{-4}$

$12 \times 10^7$

**(Total 1 mark)**

**Q52.** (a) Write in standard form 12 500

Answer \_\_\_\_\_

**(1)**

(b) Write as an ordinary number  $3.4 \times 10^{-2}$

Answer \_\_\_\_\_

**(1)**

**(Total 2 marks)**

**Q53.** Write  $9.2 \times 10^{-3}$  as an ordinary number.

\_\_\_\_\_

Answer \_\_\_\_\_

(Total 1 mark)

**Q54.** (a) Write the number 0.000 000 7 in standard form.

\_\_\_\_\_

Answer \_\_\_\_\_

(1)

(b) Write  $3 \times 10^5$  as an ordinary number.

\_\_\_\_\_

Answer \_\_\_\_\_

(1)

(c) Work out  $4 \times 10^3 \times 8 \times 10^5$

Give your answer in standard form.

\_\_\_\_\_

\_\_\_\_\_

Answer \_\_\_\_\_ (2)

(Total 4 marks)

**Q55.** Work out  $2000 \times 70\,000$

Give your answer in standard form.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

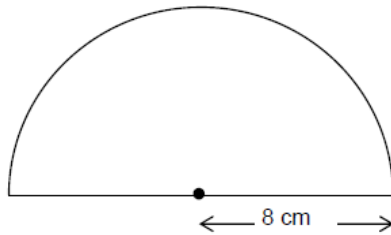
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Answer \_\_\_\_\_

(Total 2 marks)

## Calculating in Terms of $\pi$

**Q56.** The diagram shows a semicircle of radius 8 cm



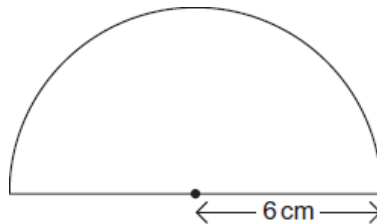
Work out the area of the semicircle. Give your answer in terms of  $\pi$ .

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Answer \_\_\_\_\_  $\text{cm}^2$   
(Total 2 marks)

**Q57.** Work out the area of a semi-circle of radius 6 cm. Give your answer in terms of  $\pi$ .



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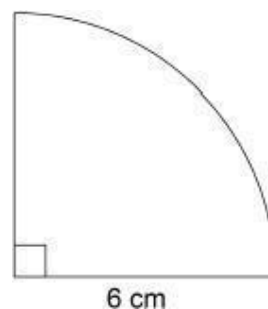
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Answer \_\_\_\_\_  $\text{cm}^2$   
(Total 2 marks)

**Q58.** Here is a quarter circle of radius 6 cm

Work out the area of the quarter circle.

Give your answer in terms of  $\pi$ .



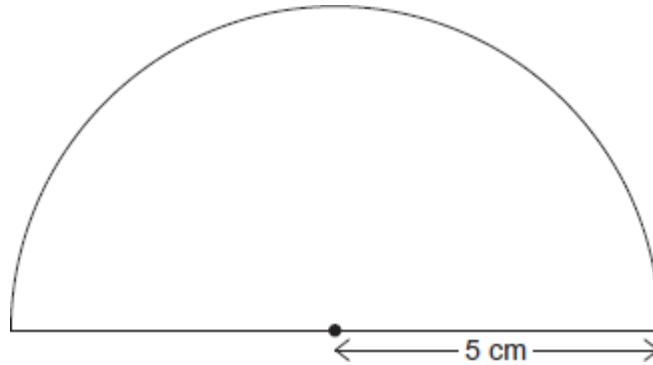
Not drawn  
accurately

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Answer \_\_\_\_\_  $\text{cm}^2$   
(Total 2 marks)

**Q59.** This semi-circle has a radius of 5 cm



Work out the **perimeter** of the semi-circle.  
Give your answer in terms of  $\pi$ .

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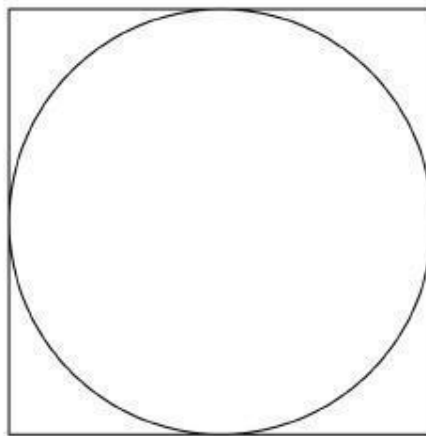
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Answer \_\_\_\_\_ cm

**(Total 3 marks)**

**Q60.** Here is a circle touching a square.



Not drawn  
accurately

The area of the square is  $64 \text{ cm}^2$

Work out the area of the circle. Give your answer in terms of  $\pi$ .

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Answer \_\_\_\_\_  $\text{cm}^2$

**(Total 3 marks)**