



Subject: Mathematics

Revision Worksheet

Name: Answers

Grade-Section: 8 CS

Date:

Teacher: Zain Hattar

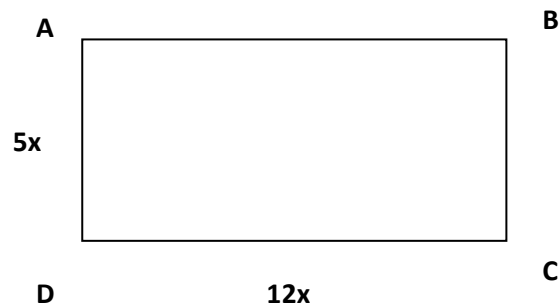
Objectives:

Revise the following: expressions and formulae, equations and inequalities, functions and graphs, area and perimeter of compound shapes and Pythagoras' Theorem.

Question 1

- Write down a simplified expression for the perimeter of the rectangle ABCD giving your answer in terms of x .

$$\begin{aligned} P &= 12x + 12x + 5x + 5x \\ &= 34x \end{aligned}$$



- Collect like terms together and simplify.
 - $x^2y^2 - 4xy + 3x^2y^2 + 13xy$
 $4x^2y^2 + 9xy$
 - $17xy + 5a - 12xy - 10ab + 3xy + 33ab$
 $8xy + 5a + 23ab$

Question 2

Simplify. Write with a single positive index.

$(2x^3 y^{-2})^2 = 4x^6 y^{-4}$ $= \frac{4x^6}{y^4}$	$\frac{20x^2 y^9 z^5}{4xy^8 z^5} = 5xy$
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Expand and simplify to the simplest form. Show your work!

$3(x + y) + 2(x - y)$ $= 3x + 3y + 2x - 2y$ $= 5x + y$	$-(x - 5) + 4x(x + 2)$ $= -x + 5 + 4x^2 + 8x$ $= 4x^2 + 7x + 5$
$(x + 4)(x - 5)$ $= x^2 - 5x + 4x - 20$ $= x^2 - x - 20$	$(x + 2)^2$ $= (x + 2)(x + 2)$ $= x^2 + 2x + 2x + 4$ $= x^2 + 4x + 4$

Question 3

A. Simplify the following algebraic fractions. Show your work!

$$\bullet \frac{2(x+1)}{4x+4} = \frac{2(x+1)}{4(x+1)} = \frac{1}{2}$$

$$\bullet \frac{3y^3 + 9y^2}{9y^2 + 27y} = \frac{3y^2(y+3)}{9y(y+3)} = \frac{y}{3}$$

B. Complete the following statements:

$$x^2 - 49 = (x + \boxed{7})(x - \boxed{7})$$

$$x^2 + 20x + 100 = (x + \boxed{10})^2$$

$$x^2 - 25 = (x + \boxed{5})(x - \boxed{5})$$

$$x^2 - 6x + 9 = (x - \boxed{3})^2$$

Question 4

Write as a single fraction in the simplest form. Show your work!

- $\frac{x}{5} + \frac{x}{3} = \frac{8x}{15}$

- $9 - \frac{9}{x} = \frac{9x-9}{x}$

- $\frac{2x}{10} + \frac{x}{3} + \frac{x}{15} = \frac{3x}{5}$

- $\frac{x}{4} - \frac{x}{12} + \frac{x}{6} = \frac{x}{3}$

Question 5

I. Using the formula $A = x^2 + 5$

Find A when $x = 0.2$

$$A = 5.04$$

Using the formula $A = 1000 x^3$

Find A when $x = 0.1$

$$A = 1$$

II. Use the balance method to make y the subject of the formula.

- $15 = 3x + 2y$

$$y = \frac{15-3x}{2}$$

- $x = \frac{2y}{3} + 1$

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

Question 6

I. Solve the following equations:

- $4x + 5 = 25$

$$x = 5$$

- $7(y - 1) = 2 - 2y$

$$y = 1$$

II. Solve the following inequalities:

- $\frac{2x - 3}{5} \leq 2$

$$x \leq 6.5$$

- $55 \leq 22 - 11x$

$$x \leq -3$$

- $3x + 10 < 6x + 4 \leq 2x + 28$

$$2 < x \leq 6$$

Question 7

- Solve these simultaneous equations by elimination:

a) $4x - 2y = 8$
 $4x + 3y = 18$



$$4x - 2y = 8$$
$$- \quad 4x + 3y = 18$$

$$- 2y - 3y = 8 - 18$$
$$- 5y = - 10$$
$$y = 2$$

****Now substitute ($y = 2$)**

$$4x - 2y = 8$$
$$4x - 4 = 8$$
$$4x = 4 + 8$$
$$4x = 12$$
$$x = 3$$

$$x = 3$$
$$y = 2$$

- b) $x + 3y = 5$ **Multiply by 2**

$$5x - 6y = 4$$
$$2(x + 3y = 5)$$
$$5x - 6y = 4$$



$$2x + 6y = 10$$
$$+ \quad 5x - 6y = 4$$

$$2x + 5x = 10 + 4$$
$$7x = 14$$
$$x = 2$$

Now substitute ($x = 2$)

$$x + 3y = 5$$
$$2 + 3y = 5$$
$$3y = 5 - 2$$
$$3y = 3$$
$$y = 1$$

$$x = 2$$
$$y = 1$$

c) $3x - y = 1$ **Multiply by 3**

$$2x + 3y = 8$$

$$3(3x - y = 1)$$

$$2x + 3y = 8$$

$$9x - 3y = 3$$

+

$$2x + 3y = 8$$

$$9x + 2x = 3 + 8$$

$$11x = 11$$

$$x = 1$$

Now substitute ($x = 1$)

$$2x + 3y = 8$$

$$2 + 3y = 8$$

$$3y = 8 - 2$$

$$3y = 6$$

$$y = 2$$

$$x = 1$$

$$y = 2$$

• **Solve these simultaneous equations by substitution:**

a) $x - 3y = 1$

$$2x - 5y = 3$$

Make x the subject: $x = 3y + 1$

Substitute x by $(3y+1)$

$$2(3y+1) - 5y = 3$$

$$6y + 2 - 5y = 3$$

$$y + 2 = 3$$

$$y = 3 - 2$$

$$y = 1$$

Now substitute $y = 1$ to find x

$$x = 3y + 1$$

$$x = 3 \times 1 + 1$$

$$x = 4$$

$$x = 4$$

$$y = 1$$

b) $x + 3y = 4$
 $3x - 2y = 1$

Make x the subject: $x = 4 - 3y$

Substitute x by $(4 - 3y)$

$$3(4 - 3y) - 2y = 1$$

$$12 - 9y - 2y = 1$$

$$12 - 11y = 1$$

$$12 - 1 = 11y$$

$$11 = 11y$$

$$y = 1$$

Now substitute $y = 1$ to find x

$$x = 4 - 3y$$

$$x = 4 - 3 \times 1$$

$$x = 4 - 3$$

$$x = 1$$

$$x = 1$$

$$y = 1$$

Question 8

I. Find the gradient of the line joining (2, 5) and (4, 9).

$$G = \frac{9-5}{4-2} = 2$$

II. a) $3y = x + 12$

b) $y = 2x - 3$

c) $5y = 15 + 10x$

d) $y = 2 - 3x$

Which of these lines have the same gradient?

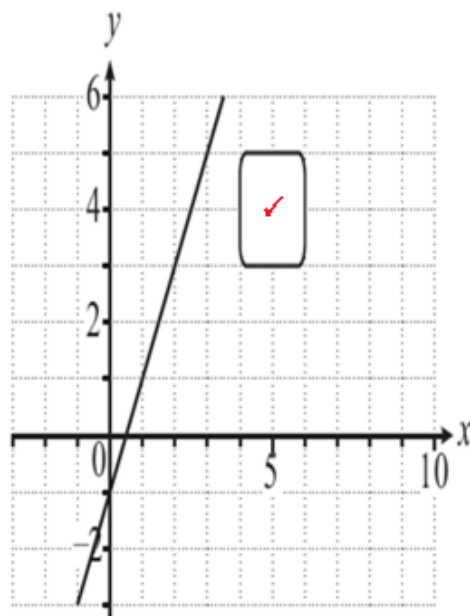
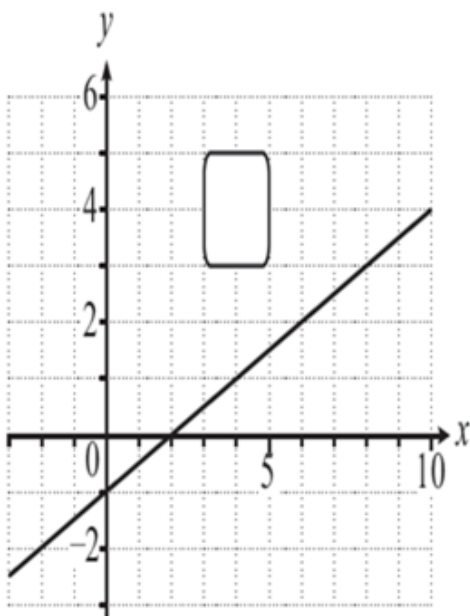
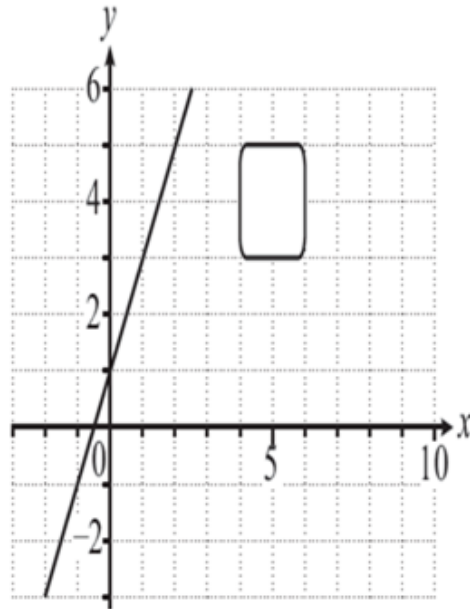
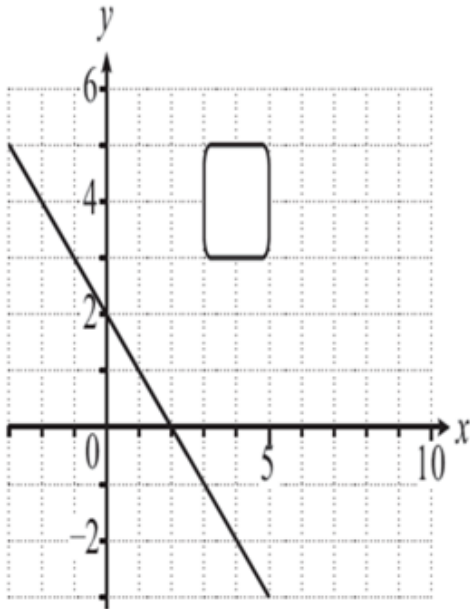
b, c

What is the y-intercept of the line: $5y = 15 + 10x$?

(0, 3)

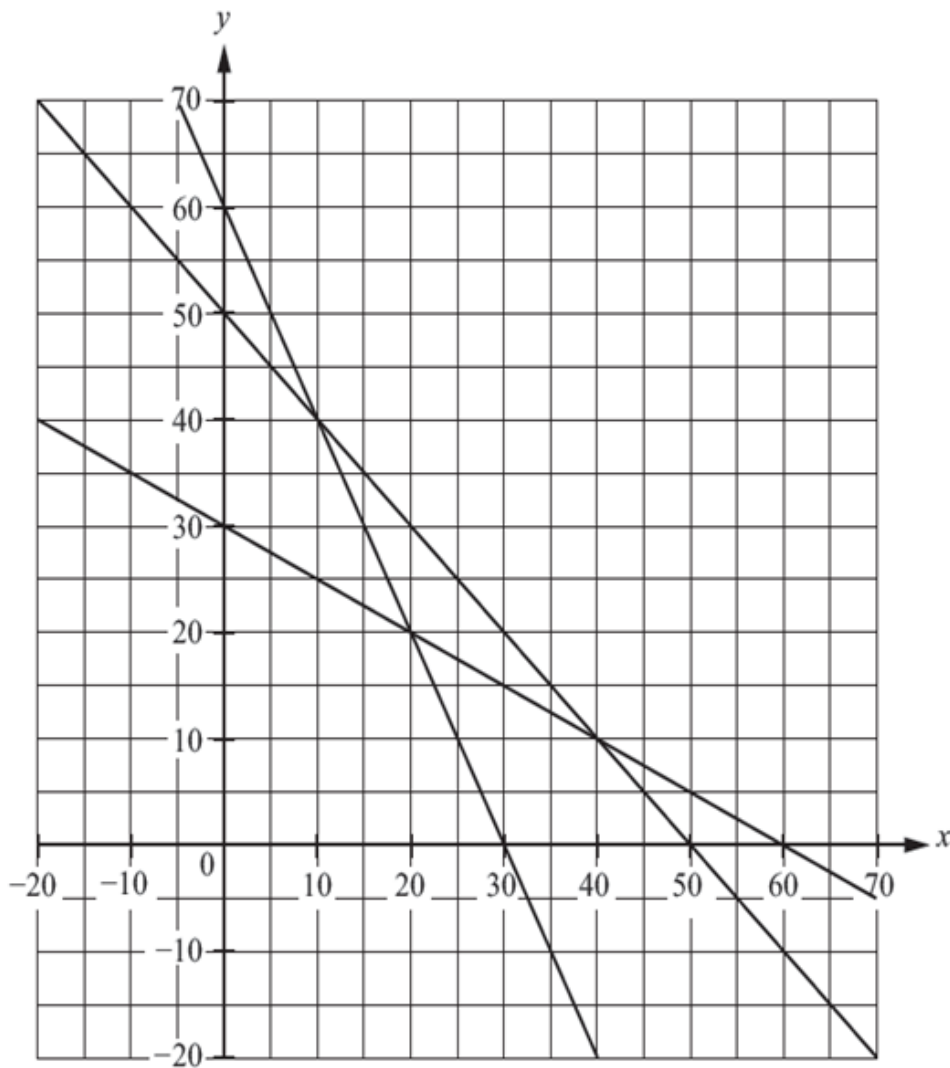
Question 9

Tick (✓) the graph of $y = 2x - 1$



Question 10

Three lines are drawn on a graph.



Use the graph to solve simultaneously these two equations

$$x + y = 50 \quad \text{and} \quad 2x + y = 60$$

$$x = 10$$

$$y = 40$$



Question 11

Here is a number line.



Tick (✓) which of these inequalities is shown on the number line.

$$-2 \leq n \leq 5$$

$$-2 < n \leq 5$$

$$-2 \leq n < 5$$

$$5 \geq n < -2$$

Question 12

Solve the following equations:

- $\frac{x}{2} - 3 = 1$

$$\frac{x}{2} = 1 + 3$$

$$\frac{x}{2} = 4$$

$$x = 8$$

$$x = 8$$

- $8y - 4 = 2y + 8$

$$8y - 2y = 4 + 8$$

$$6y = 12$$

$$y = 2$$

$$y = 2$$

- $6(x + 2) = -2(x + 6)$

$$6x + 12 = -2x - 12$$

$$6x + 2x = -12 - 12$$

$$8x = -24$$

$$x = -3$$

$$x = -3$$

- $4 + 2(5y - 1) = 6y - 18$

$$4 + 10y - 2 = 6y - 18$$

$$2 + 10y = 6y - 18$$

$$10y - 6y = -18 - 2$$

$$4y = -20$$

$$y = -5$$

$$y = -5$$

- $5(z - 2) = 3z - 7$

$$5z - 10 = 3z - 7$$

$$5z - 3z = 10 - 7$$

$$2z = 3$$

$$z = \frac{3}{2}$$

$$z = \frac{3}{2}$$

Question 13

Solve the following problems by constructing and solving equations.

Show your work clearly.

- A) The sum of three consecutive odd numbers is 57. What are the numbers?

$$x + x + 2 + x + 4 = 57$$

$$3x + 6 = 57$$

$$3x = 51$$

$$x = 17$$

$$x + 2 = 17 + 2 = 19$$

$$x + 4 = 17 + 4 = 21$$

$$17, 19, 21$$

- B) If the perimeter of the following trapezium is 49 cm. Find the value of x.

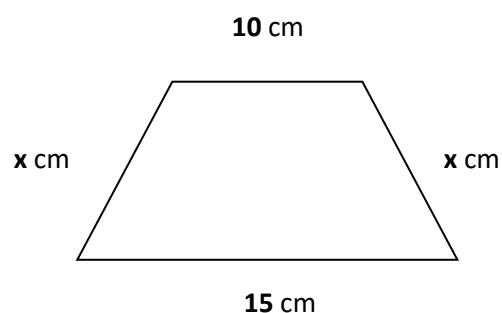
$$x + x + 10 + 15 = 49$$

$$2x + 25 = 49$$

$$2x = 49 - 25$$

$$2x = 24$$

$$x = 12 \text{ cm}$$



- C) These two rectangles have the same area. Find the value of x.

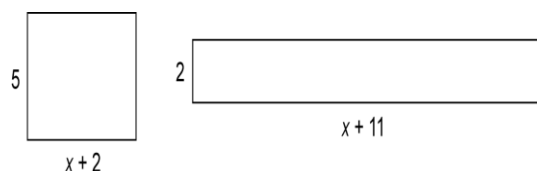
$$5(x + 2) = 2(x + 11)$$

$$5x + 10 = 2x + 22$$

$$5x - 2x = 22 - 10$$

$$3x = 12$$

$$x = 4$$



Question 14

Solve the following inequalities:

- $-2x \geq 18$

- $-2x \geq 18$ Divide by -2

- $x \leq -9$ Remember to reverse the inequality sign!

- $x + 7 \geq 28 - 6x$

- $x + 6x \geq 28 - 7$

- $7x \geq 21$

- $x \geq 3$

- $\frac{7x - 9}{2} \leq 13$

- $\frac{7x - 9}{2} \leq 13$ Multiply by 2

- $7x - 9 \leq 26$

- $7x \leq 26 + 9$

- $7x \leq 35$

- $x \leq 5$

- $3x - 8 < 6x + 1 \leq 5x + 11$

- $3x - 8 < 6x + 1$

- $-1 - 8 < 6x - 3x$

- $-9 < 3x$

- $-3 < x$

- $6x + 1 \leq 5x + 11$

- $6x - 5x \leq 11 - 1$

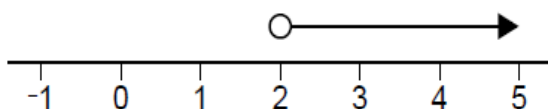
- $x \leq 10$

$-3 < x \leq 10$

Question 15

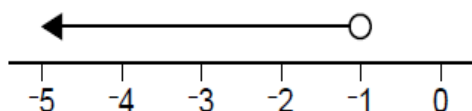
I) Write the inequality represented by each of these number lines in the box below:

a)



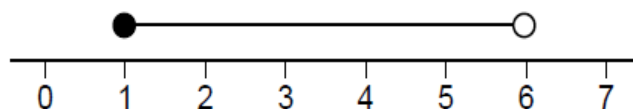
$$x > 2$$

b)



$$x < -1$$

c)



$$1 \leq x < 6$$

II) Which whole numbers from 10 to 20 make both inequalities true?

$$2x - 13 \leq 19 \quad \text{and} \quad 5x - 5 \geq 50$$

$$2x - 13 \leq 19$$

$$2x \leq 19 + 13$$

$$2x \leq 32$$

$$x \leq 16$$

$$5x - 5 \geq 50$$

$$5x \geq 50 + 5$$

$$5x \geq 55$$

$$x \geq 11$$

11, 12, 13, 14, 15, 16

Question 16

Some children are feeding cats. Altogether the cats and the children have 8 heads and 26 feet.

How many children and how many cats are there?

Write down the related equations:

where x : number of children

and y : number of cats

$$x + y = 8$$

$$2x + 4y = 26$$

Solve these equations:

$$x + y = 8$$

$$2x + 4y = 26$$

$$2(x + y = 8) \quad \text{Multiply by 2}$$

$$2x + 4y = 26$$



$$2x + 2y = 16$$

$$2x + 4y = 26$$

$$2y - 4y = 16 - 26$$

$$-2y = -10$$

$$y = 5$$

Now substitute ($y = 5$)

$$x + y = 8$$

$$x + 5 = 8$$

$$x = 8 - 5$$

$$x = 3$$

3 Children

5 Cats

Question 17

a) Find the gradient of the line joining the points (1, 4) and (5, 12).

$$G = \frac{12-4}{5-1} = \frac{8}{4} = 2$$

b) Find the gradient of the line joining the points (2, 7) and (6, 5).

$$G = \frac{5-7}{6-2} = \frac{-2}{4} = \frac{-1}{2}$$

Question 18

I. Find the gradient and the y-intercept for each of the following lines:

	Equation of the line	Gradient	y-intercept
a	$y = x + 10$	$m = 1$	$(0, 10)$
b	$y = 2x - 2$	$m = 2$	$(0, -2)$
c	$y = 3 - 4x$ $y = -4x + 3$	$m = -4$	$(0, 3)$
d	$2y = 8x - 2$ $y = 4x - 1$	$m = 4$	$(0, -1)$
e	$3y - 12x = 6$ $3y = 12x + 6$ $y = 4x + 2$	$m = 4$	$(0, 2)$
f	$4y = 8 - 2x$ $4y = -2x + 8$ $y = \frac{-1}{2}x + 2$	$m = \frac{-1}{2}$	$(0, 2)$

II. Using the previous table:

- Which of these lines has a positive gradient?
a, b, d, e
- Which of these lines has a negative gradient?
c, f
- Which pairs of lines have the same gradient?
d, e
- Which pairs of lines are parallel?
d, e

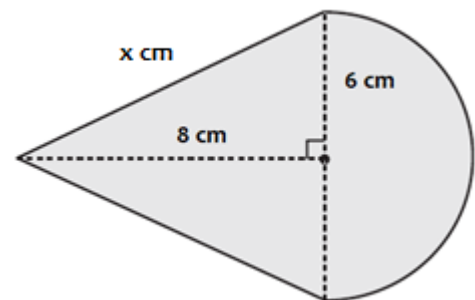
Question 19

Find the area and perimeter of the following compound shape:

* Leave your answers in terms of π

a) Area

$$\begin{aligned}\text{Area}_{\text{ semi circle}} &= \frac{1}{2} \times \pi \times r^2 \\ &= \frac{1}{2} \times \pi \times 6^2 \\ &= 18 \pi \text{ cm}^2\end{aligned}$$



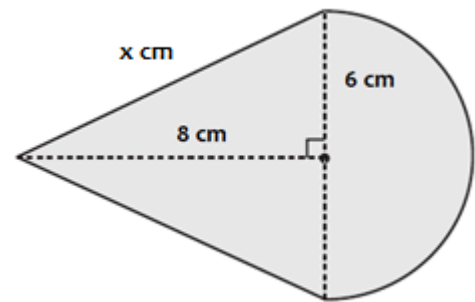
$$\text{Area}_{\text{ triangle}} = \frac{1}{2} \times b \times h = \frac{1}{2} \times 12 \times 8 = 48 \text{ cm}^2$$

$$\begin{aligned}\text{Area}_{\text{ compound shape}} &= \text{Area}_{\text{ semi circle}} + \text{Area}_{\text{ triangle}} \\ &= (18 \pi + 48) \text{ cm}^2\end{aligned}$$

b) Perimeter

$$\text{Circumference semi circle} = \frac{2 \pi r}{2}$$

$$= \pi r = 6 \pi \text{ cm}$$



Using Pythagoras' theorem:

$$x^2 = 6^2 + 8^2$$

$$x^2 = 36 + 64$$

$$x^2 = 100$$

$$x = \sqrt{100} = 10 \text{ cm}$$

$$\text{Perimeter compound shape} = 10 + 10 + 6 \pi = (20 + 6 \pi) \text{ cm}$$

Question 20

Find the unknown length represented by the letter x.

Using Pythagoras' theorem:

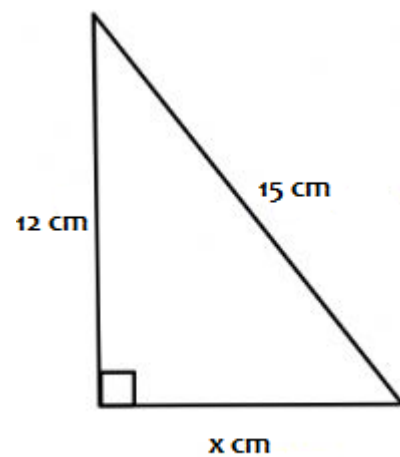
$$15^2 = x^2 + 12^2$$

$$x^2 = 15^2 - 12^2$$

$$x^2 = 225 - 144$$

$$x^2 = 81$$

$$x = \sqrt{81} = 9 \text{ cm}$$



Thank you!