

WORKSHOP CALCULATION AND SCIENCE-UNIT 1: SQUARE ROOT, RATIO & PROPORTION PERCENTAGE

SEMESTER 1

1. What is the square root of 529?

- a) 13 b) 23 c) 33 d) 43

Ans: By division method: From the right-side, split the number as two digits (5)(29)
 Find a square number to divide the first part put that as a divisor ($2 \times 2 = 4$)
 Write down the balance remainder (1)
 Add the divisor with the same number (4) and put down, find another square number (3) to form another divisor ($43 \times 3 = 129$),
 The remainder is 0 then the final quotient is the answer: **23**

$$\begin{array}{r}
 23 \\
 \hline
 2 \quad | \quad 5 \quad 29 \\
 +2 \quad | \quad 4 \\
 \hline
 43 \quad | \quad 1 \quad 29 \\
 \quad \quad | \quad 1 \quad 29 \\
 \hline
 \quad \quad | \quad 0
 \end{array}$$

2. What is the square root of 0.017?

- a) 0.001 b) 0.13 c) 0.00001 d) 0.000001

Ans: 0.13

3. What is the definition of ratio?

- a) relation of two quantities of the same kind
 b) relation of two quantities of the different kind
 c) equality between two ratios
 d) inequality between two ratios

Ans: a) relation of two quantities of the same kind

4. What is the ratio of 4 kg to 800 grams?

- a) 5:1 b) 4:8 c) 8:4 d) 2:4

Ans: The given values are in different form of units, convert them into same units

4 kg = 4000grams;

To find out the ratio = $\frac{4000}{800} = \frac{5}{1}$; the answer is **5:1**

5. What percentage of 80 is 20?

- a) 80% b) 40% c) 25% d) 20%

Ans: Say X percentage of 80 is 20, which means $80 \times \frac{X}{100} = 20$
 $X = \frac{2000}{80}$
X = 25%

6. How much is 8% of 40kg?

- a) 2.2 kg b) 3.2 kg c) 4.2 kg d) 5.2 kg

Ans:

8% of 40kg = $\frac{8}{100}(40) = 3.2\text{kg}$

7. Convert 52% into fraction?

- a) 9/25 b) 11/25 c) 13/25 d) 17/25

Ans: Write down 52% as = $\frac{52}{100} = \frac{13}{25}$

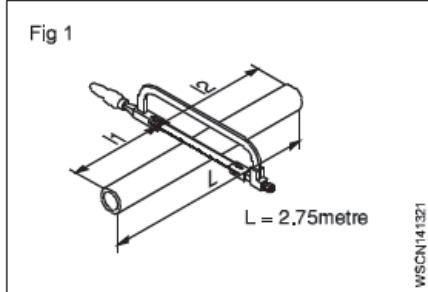
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8. Convert 0.456 decimal fraction into percentage?

- a) 45.6% b) 4.56% c) 0.456% d) 0.0456%

Ans: Write down the decimal fraction as $= \frac{456}{1000} = \frac{45.6}{100} = \mathbf{45.6\%}$

9. What is the length L2, if total length (L) is 2.75 metre and L1:L2 = 2:3



- a) 1.1 m b) 1.25 m c) 1.65 m d) 1.75m

Ans: Given $L = 2.75 = L1 + L2$ and $L1:L2 = 2:3$;

Divide L by total of the ratio ($2+3 = 5$)

$$2.75/5 = 0.55$$

$$L1 = 0.55 * 2 = 1.1$$

$$L2 = 0.55 * 3 = \mathbf{1.65}$$

10. How many days a mechanic takes to assemble 64 machines if he assembles 8 machines in 3 days?

- a) 20 days b) 22 days c) 24 days d) 26 days

Ans: To assemble 8 machines = 3 days
 To assemble 64 machines = $\frac{64 \times 3}{8} = \mathbf{24 \text{ days}}$

11. What will be the rpm of smaller gear if a 180mm dia meshes with 60 mm dia gear and the bigger gear makes 60 rpm?

- a) 120 rpm b) 140 rpm c) 160 rpm d) 180 rpm

Ans: 180 mm diameter meshes with 60 mm diameter gear and the bigger gear makes 60 rpm.

To Find: What will be the rpm of smaller gear?

Diameter of smaller gear D1 = 60mm

Speed of smaller gear = N1

Diameter of larger gear D2 = 180mm

Speed of smaller gear = N2 = 60 rpm

Relation between diameter and speed of rotation of gear $\frac{N1}{N2} = \frac{D2}{D1}$;

$$\frac{N1}{60} = \frac{180}{60}$$

$$\mathbf{N1 = 180 \text{ rpm}}$$

12. What is the square of 0.01?

- a) 0.001 b) 0.0001 c) 1.0E-5 d) 1.0E-6

Ans: $0.01 \times 0.01 = \mathbf{0.0001}$ (The sum of the figures to the right of decimal point is 4. Hence the answer is 0.0001)

13. What percentage of 80 is 20?

- a) 80% b) 40% c) 25% d) 10%

Ans: Say X percentage of 80 is 20, which means $80 \times \frac{X}{100} = 20$
 $\mathbf{X = 25\%}$

14. What is the x value for $x^2 + 6^2 = 102$?

- a) 4 b) 6 c) 8 d) 10

Ans: $x^2 = 102 - 6^2$;
 $x = \sqrt{64} = \mathbf{8}$

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15. What is the square root of decimal number 550.37?

- a) 21.26 b) 22.36 c) 22.46 d) 23.46

Ans: 23.4

	2	3	.	4
2	5	50	37	
+2	4			
	43	1	50	
+3	1	29		
	46	4	21	37
			18	56
			2	81

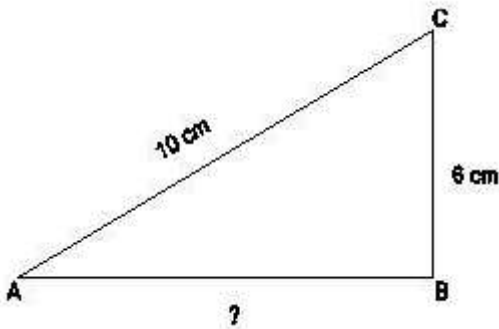
16. What is the value of $\sqrt{8} + \sqrt{18} - 2\sqrt{2}$?

- a) 2.24 b) 3.24 c) 4.24 d) 5.24

Ans: $= \sqrt{4 \times 2} + \sqrt{9 \times 2} - 2\sqrt{2}$
 $= \sqrt{4}\sqrt{2} + \sqrt{9}\sqrt{2} - 2\sqrt{2}$
 $= 2\sqrt{2} + 3\sqrt{2} - 2\sqrt{2}$
 $= 3\sqrt{2} = 3 \times 1.414 = 4.24$

17. What is the side AB if AC = 10 cm and BC = 6 cm?

- a) 8cm b) 6cm c) 5cm d) 4cm



Ans: By Pythagoras theorem $AC^2 = AB^2 + BC^2$

Here $10^2 = AB^2 + 6^2$

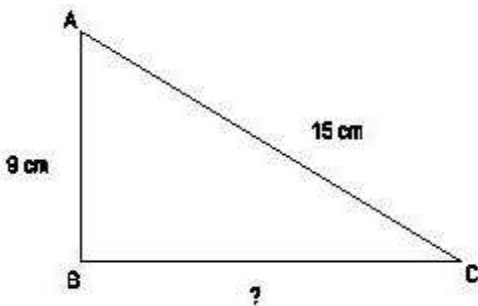
$AB^2 = 100 - 36$

$AB = \sqrt{64}$

AB = 8cm

18. What is the side BC if AC = 15 cm and AB = 9cm?

- a) 4 cm b) 8cm c) 10cm d) 12cm



Ans: By Pythagoras theorem $AC^2 = AB^2 + BC^2$

Here $15^2 = 9^2 + BC^2$

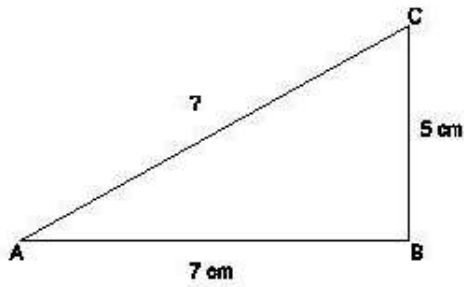
$BC^2 = 225 - 81$

$BC = \sqrt{144}$

BC = 12cm

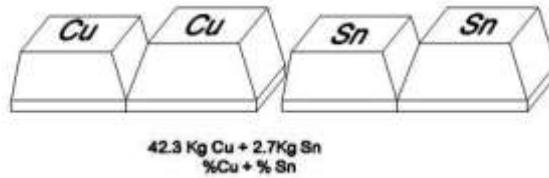
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19. What is the value of side AC if AB = 7cm and BC = 5 cm?
 a) 8.2 cm b) 8.6cm c) 8.4 cm d) 8.1 cm



Ans: By Pythagoras theorem $AC^2 = AB^2 + BC^2$
 Here $AC^2 = 7^2 + 5^2$
 $AC^2 = 49 + 25$
 $AC = \sqrt{74}$
AC = 8.6cm

20. What is the percentage of copper if the casting weight of copper 42.3 kg and tin weight 2.7kg?
 a) Cu 92% b) Cu 94% c) Cu 96% d) 98%



Ans: Percentage of Copper = $\frac{\text{Weigh of copper}}{\text{Weigh of copper} + \text{Weigh of Tin}}$
 $= \frac{42.3}{45}$
 $= 0.94 = 0.94 \times \frac{100}{100} \% = \text{Cu } \mathbf{94\%}$

21. A motor cycle tyre is sold for Rs 300/- what is the purchase price if 25% profit is added to it.
 a) Rs.200 b) Rs.220 c) Rs.240 d) Rs.260

Ans:

Selling price = Purchased price + Profit
 Rs. 300 = Purchased price + 25% of Purchased price
 $\text{Rs.300} = \text{Purchased price} \left(1 + \frac{25}{100} \right)$
 $\text{Rs.300} = \text{Purchased price} \times 1.25$
Purchased price = $\frac{300}{1.25} = \text{Rs.240}$

22. What is the decimal fraction of conversion of 18.5%?
 a) 0.185 b) 0.175 c) 0.165 d) 0.195

Ans: $18.5\% = \frac{18.5}{100} = \mathbf{0.185}$

23. Convert 52% into fraction?
 a) 9/25 b) 11/25 c) 13/25 d) 17/25

Ans: $52\% = \frac{52}{100} = \frac{13}{25}$