



CREST Mathematics Olympiad (CMO) Worksheet *for* Class 8



Topic

Comparing Quantities



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Worksheet on Comparing Quantities

1. The price of sugar has increased by 30%. What percentage of sugar intake needs to be reduced in order to maintain the same amount spent on sugar?
 - a. $3\frac{1}{13}\%$
 - b. $13\frac{1}{13}\%$
 - c. $23\frac{1}{13}\%$
 - d. $33\frac{1}{13}\%$
2. Shakira bought a washing machine for \$956.25 including 12.5% value-added tax. What was the price of the washing machine before the value-added tax was added?
 - a. \$750
 - b. \$850
 - c. \$950
 - d. \$1050
3. A jewellery shop in New York allows a 25% discount on its jewellery and still makes a profit of 25%. What is the marked price of a pair of synthetic ruby earrings that the shopkeeper bought for \$500?
 - a. \$833.33
 - b. \$833.66
 - c. \$866.33
 - d. \$866.66
4. Mr. Bond borrowed \$95000 from a bank at 13% per annum in simple interest and an equal sum from another bank at 6% per annum compounded half-yearly. What is the total interest paid to the banks by Mr Bond in a year?
 - a. \$18105.50
 - b. \$18115.50
 - c. \$18125.50
 - d. \$18135.50
5. What is the compound interest on \$62500 for 6 months at 8% per annum compounded quarterly?
 - a. \$2512.5
 - b. \$2525
 - c. \$2537.5
 - d. \$2550

Answer Key

1. c - $23\frac{1}{13}\%$

Explanation: Let price of x kg of sugar be \$100.

The price of sugar has increased by 30%.

Increase in price of sugar = 30% of \$100 = $(30/100) \times 100 = \$30$

Increased price = \$100 + \$30 = \$130

Consumption of sugar at \$130 = x kg

Sugar intake needs to be reduced in order to maintain the same amount spent on sugar.

Consumption of sugar at \$1 = x/130 kg

Consumption of sugar at \$100 = $(x/130) \times 100 = 10x/13$

Decrease in consumption = $x - 10x/13 = 3x/13$

Required % of decrease in consumption =

$$\frac{\frac{3x}{13}}{x} \times 100 = \frac{300}{13} \% = 23\frac{1}{13} \%$$

2. b - \$850

Explanation: Price of a washing machine including value-added tax = \$956.25

Let price of washing machine before value added tax was added be \$x.

Value-added tax = 12.5% of Price before value-added tax

$$= 12.5/100 \times x$$

$$= \$ (125x/1000)$$

Price before value added tax + Value added tax = Price including value added tax

$$\Rightarrow x + 125x/1000 = 956.25$$

$$\Rightarrow (1000x + 125x)/1000 = 95625/100$$

$$\Rightarrow 1125x/1000 = 95625/100$$

$$\Rightarrow x = [(95625/100) \times 1000]/1125$$

$$\Rightarrow x = \$850$$

3. a - \$833.33

Explanation: Cost Price (C.P.) of a pair of earrings = \$500

Profit% = 25%

Selling Price (S.P.) of a pair of earrings = $[(100 + \text{profit}\%) \div 100] \times \text{C.P.}$

$$= [(100 + 25) \div 100] \times 500$$

$$= (125 \div 100) \times 500$$

$$= \$625 \dots\dots\dots(1)$$

Let Marked Price (M.P.) of a pair of earrings be \$x.

Discount% = 25%

Selling Price (S.P.) of a pair of earrings = $[(100 - \text{Discount}\%) \div 100] \times \text{M.P.}$

$$= [(100 - 25) \div 100] \times x$$

$$= (75 \div 100) \times x$$

$$= \$\left(\frac{75x}{100}\right) \dots\dots\dots(2)$$

From (1) and (2),

$$\frac{75x}{100} = 625$$

$$\Rightarrow x = 625 \times \frac{100}{75}$$

$$\Rightarrow x = \$833.33$$

Marked price of a pair of synthetic ruby earrings is \$833.33.

4. d - \$18135.50

Explanation: In case of Simple Interest:

$$P = \$95000$$

$$R = 13\% \text{ p.a}$$

$$T = 1 \text{ year}$$

$$\text{S.I.} = (P \times R \times T) \div 100$$

$$= (95000 \times 13 \times 1) \div 100$$

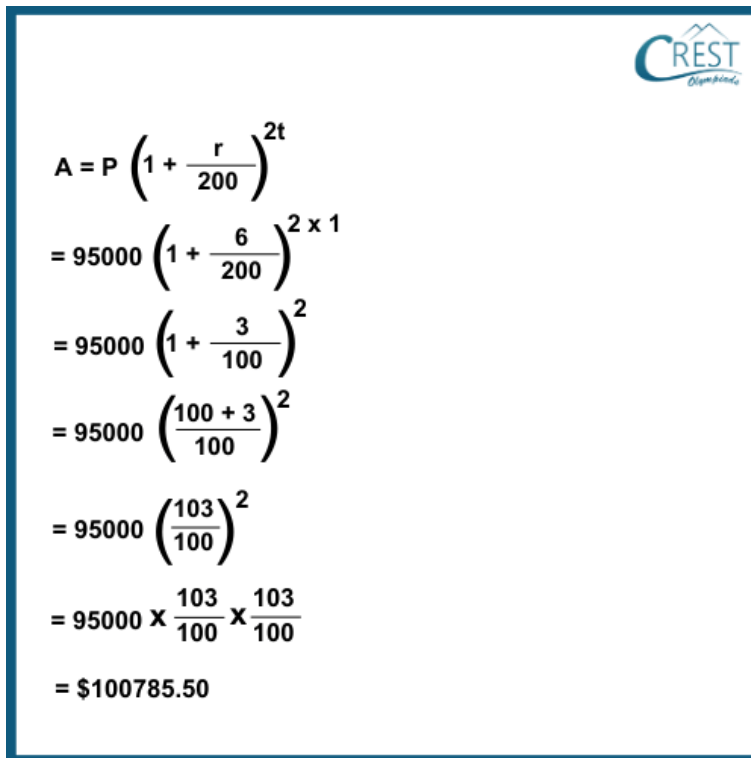
$$= \$12350$$

In case of Compound Interest:

$$P = \$95000$$

$$r = 6\% \text{ p.a (Compounded half yearly)}$$

$$t = 1 \text{ year}$$



$$\begin{aligned}
 A &= P \left(1 + \frac{r}{200}\right)^{2t} \\
 &= 95000 \left(1 + \frac{6}{200}\right)^{2 \times 1} \\
 &= 95000 \left(1 + \frac{3}{100}\right)^2 \\
 &= 95000 \left(\frac{100 + 3}{100}\right)^2 \\
 &= 95000 \left(\frac{103}{100}\right)^2 \\
 &= 95000 \times \frac{103}{100} \times \frac{103}{100} \\
 &= \$100785.50
 \end{aligned}$$

$$\text{C.I.} = A - P$$

$$= 100785.50 - 95000$$

$$= \$5785.50$$

Total interest paid to the banks by Mr. Bond in a year = S.I. + C.I.

$$= \$ (12350 + 5785.50)$$

$$= \$18135.50$$

5. b - \$2525

Explanation: P = \$62500

r = 8% p.a (Compounded quarterly)

t = 6 months = 6/12 year = $\frac{1}{2}$ year


$$\begin{aligned} A &= P \left(1 + \frac{r}{400} \right)^{4t} \\ &= 62500 \left(1 + \frac{8}{400} \right)^{4 \times \frac{1}{2}} \\ &= 62500 \left(1 + \frac{1}{50} \right)^2 \\ &= 62500 \left(\frac{50+1}{50} \right)^2 \\ &= 62500 \left(\frac{51}{50} \right)^2 \\ &= 95000 \times \frac{51}{50} \times \frac{51}{50} \\ &= \$65025 \\ \text{C.I.} &= A - P \\ &= \$ (65025 - 62500) \\ &= \$2525 \end{aligned}$$

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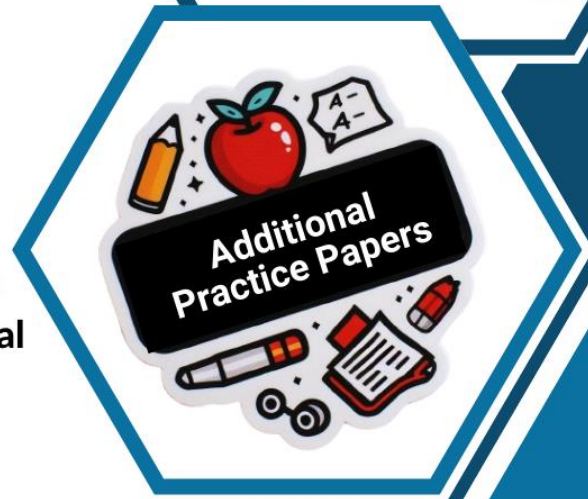
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