NOTES

CLASS 8
MATHS

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COMPARING QUANTITIES

I. Important Concepts/ Result

1. Discount is a reduction given on marked price.
    a. Discount = Marked Price - Sale Price (S.P.)
2. Discount can be calculated when discount percentage is given.
    a. Discount $= \ Discount\ \%\ of\ Marked\ Price$
    b. Discount per cent $= \frac{Discount}{Marked\ \ Price} \times 100\%$
3. Additional expenses made after buying an article are included in the cost price and are known as overhead expenses.
    a. cost price = buying price + overhead expenses
4. Sales Tax is charged on the sale of an item by the government and is added to the Bill Amount.
    a. Sales tax = Tax% of sale amount
    b. Nowadays, prices include Value Added Tax (VAT). Since July 1, 2017, India implemented the Goods and Services Tax (GST), a unified tax on goods and services.
5. Interest is the extra money paid for deposited or borrowed funds. Simple interest occurs when the principal remains constant, calculated using the formula:
6. Simple Interest = (Principal x Rate x Time)/100. Amount equals the sum of the principal and simple interest.
7. Deducing a formula for compound interest $A = P\left(1 + \frac{R}{100}\right)^n$

Where,P = Principal, R= Rate of interest per annum compounded annually,
n = Number of years, A = Amount, CI = A-P

8. Compound interest formula finds applications in population growth, bacterial growth, and evaluating the value of an item with increased or decreased prices. The formula considers R to be positive for increase and negative for decrease.

Multiple Choice Questions:

1. The fraction 2/5 converted to percentage is
    (a) 20% (b) 30% (c)40% (d)50%. **Ans: (c) 40%**

2. Out of 100 students of a class, 30% like to watch T.V. How many students like to watch T.V.?
    (a) 70 (b) 60 (c) 50 (d) 30. **Ans: (d) 30.**

3. Apala has 200 with her. She spent 80% amount she had. How much money is left with her?
    (a) 10 (b) 20 (c)30 (d) 40 **Ans: (d) 40.**

4. There are 1275 trees in Chaudhary Farm. Out of these 36% trees are of fruits. How many trees of fruits are there in Chaudhary Farm?
    (a) 459 (b) 549 (c) 945 (d) 954 **Ans: (a) 459**

Case Study Based Question:

5. Ragav took a loan of Rs 8,000 from the bank at a simple interest rate of 5% per annum for two years, and he has to pay back the total amount at the end of two years. Answer the following questions based on the case study:

    A. What is the total amount Ragav has to pay back after two years?
    B. What is the interest money that Ragav has to pay?
    C. What would be the interest amount if Ragav had borrowed the same amount at a rate of 7% per annum?
    D. What would be the total amount due if Ragav borrowed Rs 10,000 at the same 5% per annum simple interest rate for three years?

Ans: **A.** To find the total amount Ragavmust pay back after two years, we need to use the formula for simple interest:

Simple Interest = $\frac{Principal\ \ x\ Rate\ x\ Time}{100}$

Here, Principal = Rs 8,000, Rate = 5% per annum, and Time = 2 years.
So, the simple interest on the loan would be:
Simple Interest $= \frac{8000 \times 5 \times 2}{100} = Rs\ 800$
The total amount Ragavhas to pay back after two years would be the sum of the Principal and the Simple Interest:
Total Amount = Principal + Simple Interest
Total Amount $= Rs\ 8{,}000 + Rs\ 800 = Rs\ 8{,}800$
Therefore, Ragavhas to pay back Rs 8,800 after two years.
B. The interest money that Ragav has to pay would simply be the Simple Interest calculated above:
Interest = Simple Interest, Interest = Rs 800
Therefore, Ragavhas to pay Rs 800 as interest.
C. If Ragav had borrowed the same amount at a rate of 7% per annum for two years, then the interest amount would be:
Simple Interest = $\frac{Principal\ \ x\ Rate\ x\ Time}{100}$
Simple Interest = (8000 x 7 x 2)/100 = Rs 1,120
So, the interest amount would be Rs 1,120 if the rate of interest was 7% per annum.
D. If Ragav borrowed Rs 10,000 at the same 5% per annum simple interest rate for three years, then the interest amount would be:
Simple Interest = $\frac{Principal\ \ x\ Rate\ x\ Time}{100}$
Simple Interest = (10,000 x 5 x 3)/100 = Rs 1,500
The total amount due after three years would be the sum of the Principal and the Simple Interest:
Total Amount = Principal + Simple Interest
Total Amount = Rs 10,000 + Rs 1,500 = Rs 11,500
Therefore, the total amount due would be Rs 11,500 if the loan amount was Rs 10,000 and the rate of interest was 5% per annum for three years.

Short answer type question

6. A shirt has a marked price of ₹1200. If a discount of 20% is given, what will be the selling price of the shirt?

Answer: To find the selling price, first find the discount amount.
Discount amount = $\frac{(Marked\ \ Price \times Discount\ \ percent\ )}{100}$
Discount amount = $\frac{(₹1200 \times 20)}{100} = ₹240$
Selling Price = Marked Price - Discount amount
Selling Price = ₹1200 - ₹240 = ₹960
Hence, the selling price of the shirt after the discount is ₹960.

7. A book has a market price of ₹300 excluding tax. If 6% GST is added to the cost of the book, what will be the total cost of the book including GST?

Answer: To find the total cost of the book including GST, first calculate the GST amount.
GST amount = $\frac{(Marked\ \ Price \times GST\ rate\ )}{100}$
GST amount = $\frac{(₹300 \times 6)}{100}$ = ₹18
Total Cost of the book = Marked Price + GST amount
Total Cost = ₹300 + ₹18 = ₹318
Hence, the total cost of the book, including GST, is ₹318.

8. John invested ₹2000 at a compound interest rate of 6% per annum for 2 years. Calculate the compound interest.

Answer: To calculate the compound interest, we first need to find the amount at the end of 2 years.

The formula for compound interest is: $A = P\left(1 + \frac{R}{100}\right)^n$

where: A is the amount at the end of the period, P is the principal amount (₹2000 in this case)
r is the interest rate (6% per annum), n is the number of years (2 years)

$$A = 2000\left(1 + \frac{6}{100}\right)^2 = 2000\,(1 + 0.06)^2 = 2000\,(1.06)^2$$

$$A = 2000\,X\,1.1236 = ₹2247.20$$

Now that we have the amount, we can calculate the compound interest:

$$CI = A - P = ₹2247.20 - ₹2000 = ₹247.20$$

So, the compound interest that John earned after 2 years is ₹247.20.

Long answer type questions

9. Seema buys a dress originally priced at Rs. 1,000 but with a 20% discount and a 5% GST applied. Rahul invests Rs. 10,000 in a mutual fund with a 6% annual compound interest rate. Determine the final cost of the dress for Seema after accounting for the discount and GST, as well as the total amount Rahul will earn after two years with the compound interest.

Ans: Case 1:

To find the final amount Seema needs to pay, we'll first calculate the discount and then apply the GST.

Step 1: Calculate the discount amount

Discount percentage = 20%

Discount = $(Marked\ price \times Discount\ percentage)$ = $(1000 \times 20\%)$ = Rs. 200

Step 2: Calculate the selling price after discount

Selling price after discount = Marked price - Discount = Rs. 1000 - Rs. 200 = Rs. 800

Step 3: Calculate the GST on the discounted price: GST percentage = 5%

GST = $(Selling\ price\ after\ discount \times GST\ percentage) = (800 \times 5\%) = Rs.40$

Step 4: Calculate the final amount by adding GST

Final amount = Selling price after discount + GST = Rs. 800 + Rs. 40 = Rs. 840

So, Seema needs to pay a final amount of Rs. 840 for the dress after considering the discount and GST.

Case 2: To find the amount Rahul will receive at the end of two years and the total interest he earns, we can use the compound interest formula.

Compound interest formula: $A = P\left(1 + \frac{R}{100}\right)^n$

Where, A = Final amount, P = Principal amount = Rs. 10,000

r = Annual interest rate = 6% (0.06 as decimal),

n = Number of times interest is compounded per year = 1 (compounded annually),t = Number of years = 2

Step 1: Calculate the final amount using the compound interest formula

$$A = 10000\left(1 + \frac{0.06}{1}\right)^{1\times 2} = 10000(1 + 0.06)^2 = 10000(1.06)^2$$

$$A = 10000 \times 1.1236 = Rs.11{,}236$$

Step 2: Calculate the total interest earned

Total interest = Final amount - Principal amount = Rs. 11,236 - Rs. 10,000 = Rs. 1,236

So, Rahul will receive Rs. 11,236 at the end of two years and will earn a total interest of Rs. 1,236.

10. Tom is an investor who has invested Rs 15,000 in the stock market, which is growing at a rate of 7% per annum. Meanwhile, his friend Mary bought a computer for Rs 75,000, however, its value is depreciating at a rate of 10% per annum. Tom wonders how much his investment will be worth after five years, while Mary is curious to know the value of her computer after three years. How will their respective investments perform over time?

Ans: Let's find the future value of Tom's investment and the depreciated value of Mary's computer separately.

For Tom's investment:

He has invested Rs 15,000 in the stock market, which is growing at a rate of 7% per annum.

Step 1: Identify the variables

- Principal amount (P) = Rs 15,000
- Growth rate (R) = 7% per annum
- Time (n) = 5 years

Step 2: Calculate the future value (A) using compound interest formula: $A = P\left(1 + \frac{R}{100}\right)^n$

Step 3: Put in the values and evaluate:

$A = 15000\left(1 + \frac{7}{100}\right)^5$

$A = 15000(1 + 0.07)^5$

$A = 15000(1.07)^5$

$A = 15000 \times 1.40255\ (rounded\ to\ 5\ decimal\ places)$

$A = Rs\ 21{,}038.25$

So, Tom's investment will be worth Rs 21,038.25 after five years.

For Mary's computer:

She bought the computer for Rs 75,000, and its value is depreciating at a rate of 10% per annum.

Step 1: Identify the variables

- Initial value (P) = Rs 75,000
- Depreciation rate (R) = 10% per annum
- Time (T) = 3 years

Step 2: Calculate the depreciated value (A) using the depreciation formula: $A = P\left(1 + \frac{R}{100}\right)^n$

Step 3: Putting in the values and evaluate:

$A = 75000\left(1 - \frac{10}{100}\right)^3 = 75000(1 - 0.1)^3 = 75000(0.9)^3$

$A = 75000 \times 0.729\ (rounded\ to\ 3\ decimal\ places) = Rs\ 54{,}675$

So, the value of Mary's computer will be Rs 54,675 after three years.

MCQs (Questions for Practice)

1. Convert the fraction 3/4 to percentage.
a. 60% b. 70% c. 75% d. 80%
2. Convert the decimal 0.25 to percentage.
a. 2.5% b. 10% c. 25% d. 50%
3. Convert the percentage 30% to a fraction in its simplest form.
a. 1/3 b. 3/10 c. 7/10 d. 1/5
4. Convert the percentage 40% to a decimal.
a. 0.04 b. 0.4 c. 4 d. 0.004
5. Which is larger: 20% of 250 or 30% of 200?
a. 20% of 250 b. 30% of 200 c. Both are equal d. Cannot be determined
6. If the cost price (CP) of an item is Rs 80 and the selling price (SP) is Rs 100, what is the profit?
a. Rs 10 b. Rs 20 c. Rs 30 d. Rs 40
7. Calculate the profit percentage when the cost price (CP) is Rs 400 and the selling price (SP) is Rs 500.
a. 20% b. 25% c. 30% d. 35%
8. If the marked price (MP) of an item is Rs 150, and a 20% discount is offered, calculate the selling price (SP).
a. Rs 100 b. Rs 110 c. Rs 120 d. Rs 130
9. The simple interest on a principal amount of Rs 500 at a rate of 5% per annum for 2 years is:
a. Rs 25 b. Rs 50 c. Rs 75 d. Rs 100
10. A customer has to pay 7% sales tax on an item worth Rs 100. Calculate the total amount the customer needs to pay, including the sales tax.
a. Rs 93 b. Rs 100 c. Rs 107 d. Rs 120

Short answer type question(For Practise)

1. What is the profit obtained when an item with a cost price of Rs 100 is sold at a selling price of Rs 150?
2. Calculate the loss incurred if an item with a cost price of Rs 80 is sold for Rs 60.

3. If the cost price of an item is Rs 200 and the profit is calculated as 25%, what is the selling price?
4. A shopkeeper offers a 10% discount on a product with a marked price(Sales price) of Rs 300. What is the selling price after discount?
5. Calculate the discount percentage if a product with a marked price of Rs 500 was sold for Rs 400.
6. Express a 25% discount as a fraction and a decimal.
7. If you invest Rs 1000 at a 5% annual interest rate, how much simple interest will you receive after 2 years?
8. Calculate the compound interest earned on an investment of Rs 5000 at a 6% annual interest rate, compounded annually for 3 years.
9. Compare the simple and compound interest for an investment of Rs 2000 at a 4% annual interest rate over 4 years.
10. If a sales tax of 5% is levied on an item with a cost price of Rs 350, what is the final price including sales tax?

Long answer type questions (For Practise)

1. A tree grows at a rate of 12% per year. If the initial height of the tree is 25 meters, how tall will the tree be after 4 years?
2. Kelly purchased 50 notebooks for a total of Rs 500. She sold each notebook for Rs 12. Calculate the total profit or loss on the transaction and the profit or loss percentage.
3. A product has a Marked Price (MP) of Rs 80 and a Selling Price (SP) of Rs 68, after applying a discount. Calculate the discount amount, discount percentage, and represent the discount as a fraction and decimal.
4. Calculate Compound Interest, the amount after 3 years, and compare it to the Simple Interest. Given: Principal = Rs 400, Rate = 8%, and Time = 3 years.
5. Find the principal, rate of interest, and time, if the simple interest on a particular amount is Rs 600, and the total amount after 2 years is Rs 2600.
6. A person buys a television for Rs 1500, which includes 10% VAT. Calculate the original cost of the television before VAT, and the amount of VAT paid.

Case Study Based Questions (For Practise)

Clothing Store

John runs a small clothing store in his town. Last month, he sold a limited-edition shirt with different discount offers. He noticed two schemes brought significantly different sales.

Scheme A: - A marked price (MP) of Rs 80. - A discount percentage of 25%.
- The selling price (SP) can be calculated by converting the discount to a fraction or decimal.

Scheme B: - A marked price (MP) of Rs 100. - A flat discount of Rs 24 on each shirt.
- The selling price (SP) can be calculated using the discount.

(a). What were the selling prices for both schemes?
(b). Which scheme generated more revenue if he sold 100 shirts under each scheme?

Case Study 2: Savings For Education

Amit wants to invest Rs 10,000 for his son's education. He is considering two options for investment: a simple interest-bearing account and a compound interest-bearing account. Below are the available investment options:

Option 1 (Simple Interest): - Principal: Rs 10,000.- Rate of interest: 6% per year. - Time: 10 years.
- Calculate the simple interest and the total amount after 10 years.

Option 2 (Compound Interest): - Principal: Rs 10,000. - Rate of interest: 5% per year, compounded annually. - Time: 10 years.

Calculate the compound interest and the total amount after 10 years.
(a). Which option would result in a higher return at the end of 10 years?
(b). If Amit has the option of including a 5% VAT (Value-Added Tax) on the interest earned for one of the options, which option should he choose for maximizing the final amount?

Answers MCQ (PRACTISE)

1. c. 75%	2. c. 25%	3. b. 3/10	4. b. 0.4
5.. a. 20% of 250	6. b. Rs 20	7. b. 25%	8. c. Rs 120
9.. d. Rs 100	10. c. Rs 107		

Answers: (Sort Answer Type Questions)

1. Profit = SP - CP = Rs 150 - Rs 100 = Rs 50.
2. Loss = CP - SP = Rs 80 - Rs 60 = Rs 20.
3. Profit amount = Rs 50. Selling Price = CP + Profit amount = Rs 250.
4. Discount amount = Rs 30. Selling Price (SP) = MP - Discount amount = Rs 270.
5. Discount amount = Rs 100. Discount percentage = 20%.
6. As a fraction: 25/100 = 1/4. As a decimal: 0.25.
7. Simple Interest = Rs 200.
8. Compound Interest ≈ Rs 955.08.
9. Simple Interest = Rs 320.Compound Interest ≈ Rs 341.19.
10. Sales tax amount = Rs 17.50. Final price = Rs 367.50.

Answers: (Long Answer type Questions)

1. Height of the tree would be approximately 48.69 meters.
2. Total Profit = Rs 100, Profit Percentage =20%
3. Discount amount =Rs 12, Discount Percentage = 15%, Fraction = 3/20, Decimal= 0.15
4. Compound Interest > Simple Interest (Rs 104 > Rs 96)
5. Principal = Rs 2000, Rate of interest = 15%, Time = 2 years
6. Cost before VAT = Rs 1363.64, VAT amount = Rs 136.36

Answer Key: (Case Study 1: Clothing Store)

1. Scheme A: Rs 60, Scheme B: Rs 76.
2. Scheme A: Rs 6,000 in revenue, Scheme B: Rs 7,600 in revenue.
Hence, Scheme B generated more revenue.

Answer Key: (Case Study 2: Savings For Education)

1. Option 1 (Simple Interest): Rs 16,000, Option 2 (Compound Interest): Rs 6,386.16.
Hence, Option 2 (Compound interest) would result in a higher return.
2. Adding 5% VAT on the interest earned in Option 1: Rs 16,300, Adding 5% VAT on the interest earned in Option 2: Rs 16,705.47.
Therefore, Amit should choose Option 2 (Compound interest) for maximizing the final amount.

Test-1 (20 marks)

Section A: Multiple Choice Questions (MCQs) - 1 marks each (5 marks)

Question 1: The percentage of profit or loss is calculated on which of the following?
a) Selling Price b) Marked Price c) Cost Price d) Discount
Question 2: If a discount of 20% is given on an article, what fraction is equal to the discount percentage?
a) 1/5 b) ¼ c) 1/3 d) 1/6
Question 3: The formula for simple interest is:
$a) P \times R \times T$ $b) P \times R \times T/100$ $c) P \times T/100$ $d) P \times R/100$
Question 4: In compound interest, the interest for each period is calculated on:
a) Principal b) Principal + Accumulated Interest c) Principal – Interest d) Principal × Interest
Question 5: Which of the following is the formula to find the amount under compound interest?
$a) A = P(1 + \frac{R}{100})^T$ $b) A = P + \frac{P \times R \times T}{100}$ $c) A = P \times (1 + R \times T)$ $d) A = P - \frac{P \times R \times T}{100}$

Section B: Short-Answer Questions - 2 marks each (6 marks)

Question 6: What is the difference between simple interest and compound interest in terms of calculation?

Question 7: If an item costs $500 and is sold for $600, how much is the profit percentage?
Question 8: Convert 25% of discount into a decimal.

Section C: Long-Answer Question - 5 marks (5 marks)

Question 9: Explain the impact of applying GST and compound interest on the price of an item.

Section D: Case Study Based Question - 2 marks each (4 marks)

Question 10: Case Study: A business owner purchased an article for Rs 2000 and marked its price 20% above the cost price. The owner offered a discount of 10% during a sale. Calculate the selling price and profit percentage after the discount.

Chapter Test 2 (30 marks)

Multiple Choice Questions (6 questions, 1 mark each):

1. If the selling price of an item is Rs 300 and the cost price is Rs 250, what is the profit?
a) Rs 50 b) Rs 150 c) Rs 450 d) Rs 350
2. If the profit percentage is 20% and the cost price of an item is Rs 400, what is the selling pric
a) Rs 480 b) Rs 550 c) Rs 320 d) Rs 500
3. The marked price of a product is Rs 250. If a discount of 30% is given, what is the selling price?
a) Rs 175 b) Rs 200 c) Rs 225 d) Rs 150
4. Convert a 20% discount into a decimal.
a) 0.2 b) 0.25 c) 0.15 d) 0.325.
5.If the principal amount is Rs 1000 and the simple interest is calculated at 5% per annum for 2 years, what is the total amount after 2 years?
a) Rs 1100 b) Rs 1080 c) Rs 1200 d) Rs 1050
6. Which is generally higher, simple interest or compound interest for the same initial investment and the same interest rate?
a) Simple interest b) Compound interest c) Both are equal d) Cannot be determined

Short Answer Type Questions (3 questions, 2 marks each):

7. Calculate the profit percentage if the cost price of an item is Rs 250 and the selling price is Rs 325.
8. Calculate the amount of GST on a product with a price of Rs 350 if the GST rate is 5%.
9. Find the time in years when the principal amount of Rs 500 becomes Rs 700 at an interest rate of 8% per annum simple interest.

Long Answer Type Questions (2 questions, 5 marks each):

10. Explain the differences between simple interest and compound interest using examples.
11. A shopkeeper offers a discount of 10% on the marked price of a product. If the marked price of the product is Rs 400, calculate the selling price of the product and the discount being given in both percentage and decimal. Also, calculate the amount of GST charged if the rate is 12%.

Case Study Based Questions (2 questions, 4 marks each):

12. Radha invests Rs 6000 in a compound interest savings account at an annual interest rate of 3% compounded annually. Calculate the interest she earns after 3 years and compare it to what she would have earned if it were simple interest.
13. John borrows Rs 15000 from a bank at a simple interest rate of 6% per annum. Calculate the total interest he has to pay after 4 years. Later, when John gets a loan for his business at a compound interest rate of 6% per annum, calculate the compound interest he has to pay after the same period of 4 years.

Answer Key: TEST 1

Section A:

1. c) Cost Price 2. a) 1/5 3. b) P×R×T/100 4. b) Principal + Accumulated Interest

5. a) $A = P\left(1 + \frac{R}{100}\right)^n$

Section B:

6. In simple interest, interest is calculated on the principal amount, while in compound interest, interest is calculated on the principal amount plus accumulated interest.

7. Profit Percentage = (100 × 100) / 500 = 20% 8. 0.25

Section C:

9. When GST and compound interest are applied to the price of an item, they increase the overall cost of the item. GST is a tax applied by the government on goods and services, increasing their base price. Compound interest is the interest calculated on the principal amount plus accumulated interest for each period and as a result, the total amount payable increases over time.

Section D:

10. Marked Price = 2000 + (20% x 2000) = Rs 2400
Discounted Price = 2400 - (10% × 2400) = Rs 2160
Selling Price = Rs 2160
Profit Percentage = ((2160 - 2000) / 2000) × 100 = 8%

Answer Key: TEST 2

1. a) Rs 50 2. a) Rs 480 3. a) Rs 175 4. a) 0.2 5. c) Rs 1200 6. b) Compound interest
7. 30% 8. Rs 17.50 9. 5 years
10. Explanation of the differences between simple interest and compound interest
11. [Detailed calculations of selling price, discount percentage, discount in decimal, and GST amount]
12. Compound interest: Rs 560.36, Simple interest: Rs 540
13. Simple interest: Rs 3600, Compound interest: Rs 3847.94



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