EXPRESSWALA ACADEMY

Arithmetic (Level 1)

Question Paper, Set 10

Time: 1 hour 30 minutes | Maximum marks: 50

Name: _____ Class: _____ Date: _____

1. Answer all 20 questions. The marks for each question are shown in brackets.
2. Show your working for the 2, 3 and 5 mark questions.
3. The key sheet and worked solutions are at the end of this paper.

1. Find the ratio of 8 months to 3 years in its simplest form. [1 mark]

2. Divide ₹6300 among three sisters in the ratio $5 : 6 : 7$. [3 marks]

3. Find the fourth proportional to 9, 15 and 12. [1 mark]

4. Find the mean proportional between 16 and 81. [1 mark]

5. If $\frac{a}{b} = \frac{c}{d} = \frac{2}{5}$, find the value of $\frac{3a+4c}{3b+4d}$. [2 marks]

6. A photograph of a microbe enlarged 20,000 times has a length of 4 cm. What is the actual length of the microbe? [2 marks]

7. 36 men can finish a piece of work in 25 days. After 10 days, 9 men leave. In how many days will the remaining men finish the rest of the work? [5 marks]

8. Express 45% as a fraction in its simplest form. [1 mark]

9. Find 2.5% of 640. [1 mark]

10. A number 480 is increased by 25%. Find the new number. [2 marks]

11. The present population of a city is 21,632. It has been increasing at the rate of 4% per annum. Find its population 2 years ago. [3 marks]

12. An agent gets a commission of 4% on his sales. If on a certain day he gets ₹180 as commission, find the worth of the goods sold through him that day. [2 marks]

13. A shopkeeper sells a lamp marked at ₹960 at a discount of 25% and suffers a loss of 10%. Find the discount, the selling price, the cost price and the loss. [5 marks]

14. If the cost price of 10 articles is equal to the selling price of 8 articles, find the gain or loss percent. [3 marks]

15. The average of 25 numbers is 36.4. Find their sum. [1 mark]

16. A scooter covers 168 km in 4 hours. How much distance will it cover in 7 hours at the same speed? [2 marks]

17. The speed of Sneha is 35 km/h and the speed of Priya is 56 km/h. Find the ratio of the times taken by them to cover the same distance. [2 marks]

18. A train running at 90 km/h crosses a signal post in 12 seconds. Find the length of the train. [3 marks]

19. Find the interest on ₹6000 for 2 years at 10% per annum (i) as simple interest, (ii) as compound interest, working year by year. [5 marks]

20. A sum of ₹6400 amounts to ₹7225 in 2 years at compound interest, compounded annually. Find the rate of interest per annum. [5 marks]

Key sheet

Q	Answer
1	$2:9$
2	₹1750, ₹2100, ₹2450
3	20
4	36
5	$\frac{2}{5}$
6	$\frac{1}{5000}$ cm
7	20 days
8	$\frac{9}{20}$
9	16
10	600
11	$20{,}000$
12	₹4500
13	Discount ₹240; S.P ₹720; C.P ₹800; loss ₹80
14	Gain of 25%
15	910
16	294 km
17	$8:5$
18	300 m
19	(i) ₹1200 (ii) ₹1260
20	6.25% per annum

Solutions

1. Find the ratio of 8 months to 3 years in its simplest form. [1]

3 years $= 3 \times 12$ months $= 36$ months

$\frac{8 \text{ months}}{36 \text{ months}} = \frac{8}{36} = \frac{2}{9}$

Ratio $= 2 : 9$

Ans: $2 : 9$

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2. Divide ₹6300 among three sisters in the ratio $5 : 6 : 7$. [3]

Sum of the terms of the ratio $= 5 + 6 + 7 = 18$

$1\text{st share} = \frac{5}{18} \times 6300 = 1750$

$2\text{nd share} = \frac{6}{18} \times 6300 = 2100$

$3\text{rd share} = \frac{7}{18} \times 6300 = 2450$

Ans: ₹1750, ₹2100, ₹2450

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3. Find the fourth proportional to 9, 15 and 12. [1]

Let the fourth proportional be x. Then $9 : 15 :: 12 : x$.

$9 \times x = 15 \times 12$

$x = \frac{15 \times 12}{9} = 20$

Ans: 20

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4. Find the mean proportional between 16 and 81. [1]

$\text{Mean proportional} = \sqrt{16 \times 81} = \sqrt{1296} = 36$

Ans: 36

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5. If $\frac{a}{b} = \frac{c}{d} = \frac{2}{5}$, find the value of $\frac{3a+4c}{3b+4d}$. [2]

If $\frac{a}{b} = \frac{c}{d}$ then $\frac{a}{b} = \frac{c}{d} = \frac{al+cm}{bl+dm}$.

Here $l = 3$, $m = 4$, so $\frac{3a+4c}{3b+4d} = \frac{a}{b} = \frac{2}{5}$

Ans: $\frac{2}{5}$

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6. A photograph of a microbe enlarged 20,000 times has a length of 4 cm. What is the actual length of the microbe? [2]

Times enlarged | Length (cm)

$20{,}000$ | 4

1 | y

Direct proportion: $x_1 y_2 = x_2 y_1$

$20{,}000 \times y = 1 \times 4 \Rightarrow y = \frac{1 \times 4}{20{,}000} = \frac{1}{5000}$

$\frac{1}{5000}$ cm $= 0.0002$ cm $= 2 \times 10^{-4}$ cm

Ans: $\frac{1}{5000}$ **cm**

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7. 36 men can finish a piece of work in 25 days. After 10 days, 9 men leave. In how many days will the remaining men finish the rest of the work? [5]

Work left = work of 36 men for $25 - 10 = 15$ days

Men now $= 36 - 9 = 27$

Men and days are in inverse proportion: $x_1 y_1 = x_2 y_2$

$36 \times 15 = 27 \times y \Rightarrow y = \frac{540}{27} = 20$

Ans: 20 **days**

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8. Express 45% as a fraction in its simplest form. [1]

$45\% = \frac{45}{100} = \frac{9}{20}$

Ans: $\frac{9}{20}$

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9. Find 2.5% of 640. [1]

2.5% of $640 = \frac{2.5}{100} \times 640 = 16$

Ans: 16

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10. A number 480 is increased by 25%. Find the new number. [2]

Final value after an increase of $25\% = \left(\frac{100+R}{100}\right) P$

$= \frac{100+25}{100} \times 480 = \frac{125}{100} \times 480 = 600$

Ans: 600

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11. The present population of a city is 21,632. It has been increasing at the rate of 4% per annum. Find its population 2 years ago. [3]

Population n years ago $= \frac{P}{\left(1+\frac{R}{100}\right)^n}$

$= \frac{21{,}632}{\left(1+\frac{4}{100}\right)^2} = \frac{21{,}632}{\left(\frac{26}{25}\right)^2}$

$= 21{,}632 \times \frac{25}{26} \times \frac{25}{26} = 20{,}000$

Ans: $20{,}000$

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12. An agent gets a commission of 4% on his sales. If on a certain day he gets ₹180 as commission, find the worth of the goods sold through him that day. [2]

Let the total sales be ₹x.

4% of $x = 180 \Rightarrow \frac{4}{100}x = 180$

$x = \frac{180 \times 100}{4} = 4500$

Ans: ₹4500

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13. A shopkeeper sells a lamp marked at ₹960 at a discount of 25% and suffers a loss of 10%. Find the discount, the selling price, the cost price and the loss. [5]

$\text{Discount} = 25\%$ of $960 = 240$

$\text{S.P} = 960 - 240 = 720$

$\text{C.P} = \frac{100}{100 - \text{Loss}\%} \times \text{S.P}$

$= \frac{100}{90} \times 720 = 800$

$\text{Loss} = 800 - 720 = 80$

Ans: Discount ₹240; S.P ₹720; C.P ₹800; loss ₹80

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14. If the cost price of 10 articles is equal to the selling price of 8 articles, find the gain or loss percent. [3]

Let C.P of each $= x$ and S.P of each $= y$.

$10x = 8y \Rightarrow \frac{y}{x} = \frac{10}{8} = \frac{5}{4}$

$y > x$, so there is a gain.

$\text{Gain } \% = \left(\frac{y}{x} - 1\right) \times 100 = 25\%$

Ans: Gain of 25%

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15. The average of 25 numbers is 36.4. Find their sum. [1]

$x_1 + x_2 + \cdots + x_n = n\bar{x}$

$\text{Sum} = 25 \times 36.4 = 910$

Ans: 910

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16. A scooter covers 168 km in 4 hours. How much distance will it cover in 7 hours at the same speed? [2]

4 hours → 168 km

$7 \text{ hours} \rightarrow \frac{7}{4} \times 168 = 294 \text{ km}$

Ans: 294 **km**

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17. The speed of Sneha is 35 km/h and the speed of Priya is 56 km/h. Find the ratio of the times taken by them to cover the same distance. [2]

$s_1 = \frac{d}{T_1}$, $s_2 = \frac{d}{T_2} \Rightarrow \frac{s_1}{s_2} = \frac{T_2}{T_1}$

$T_1 : T_2 = s_2 : s_1 = 56 : 35 = 8 : 5$

Ans: $8 : 5$

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18. A train running at 90 km/h crosses a signal post in 12 seconds. Find the length of the train. [3]

$\text{Speed} = 90 \times \frac{5}{18} = 25 \text{ m/s}$

To cross a post, the train travels its own length.

$\text{Length} = S \times T = 25 \times 12 = 300 \text{ m}$

Ans: 300 **m**

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19. Find the interest on ₹6000 for 2 years at 10% per annum (i) as simple interest, (ii) as compound interest, working year by year. [5]

$\text{Interest for 1st year} = 6000 \times \frac{10}{100} = 600$

(i) Simple interest: the 2nd year's interest is also 600, so S.I $= 600 + 600 = 1200$

(ii) Compound interest: new principal $= 6000 + 600 = 6600$

$\text{Interest for 2nd year} = 6600 \times \frac{10}{100} = 660$

$\text{C.I} = 600 + 660 = 1260$

Ans: (i) ₹1200 (ii) ₹1260

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20. A sum of ₹6400 amounts to ₹7225 in 2 years at compound interest, compounded annually. Find the rate of interest per annum. [5]

$A = P\left(1 + \frac{R}{100}\right)^n$
$7225 = 6400\left(1 + \frac{R}{100}\right)^2$
$\Rightarrow \left(1 + \frac{R}{100}\right)^2 = \frac{7225}{6400} = \frac{289}{256} = \left(\frac{17}{16}\right)^2$
$\Rightarrow 1 + \frac{R}{100} = \frac{17}{16} \Rightarrow \frac{R}{100} = \frac{1}{16}$
$\Rightarrow R = 6.25\%$

Ans: 6.25% **per annum**