AUTUMN BREAK HOLIDAY HOMEWORK

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##) $a^3 + 2a^2 + 2a + 1$

$a^2 + a + 1$

1) Reciprocal of 0 is

a) 0 ☐

b) 1 ☐

c) -1 ☐

d) None of the above ☑

2) The multiplicative inverse of 10^{-100} is 10^{100}

3) Find the least no. by which 1323 must be multiplied so that the product is a perfect cube.

Sol. 3 | 1323

3 | 441

3 | 147

7 | 49

7

$1323 = \overline{3 \times 3 \times 3} \times 7 \times 7$

Hence, 7 is the least no. by which 1323 must be multiplied so that the product is a perfect cube.

4) 2.7 is what percent of 18?

Sol. $\frac{2.7}{18} \times 100 = \frac{270}{18} = 30 = 15\%$

$18 \quad 18 \quad 2$

5) If A and B are 2 sets such that $n(A) = 15$, $n(B) = 21$, and $n(A \cup B) = 36$ then $n(A \cap B)$ equal to ____?

Sol. $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

$\Rightarrow 36 = 15 + 21 - n(A \cap B)$

$\Rightarrow n(A \cap B) = 15 + 21 - 36$

$\Rightarrow n(A \cap B) = 36 - 36 = 0$

6) If $5A \times A = 399$, then the value of A is ___?

Sol. $\begin{array}{r} 5A \\ \times\ A \\ \hline 399 \end{array}$

The last digit should be 9, let's put 3 in place of 'A'.

$\begin{array}{r} 53 \\ \times\ 3 \\ \hline 159 \end{array}$ Nope, let's put 7 in place of 'A'.

$\begin{array}{r} 57 \\ \times\ 7 \\ \hline 399 \end{array}$

7) If 30 men can do a work in 24 days. How many men will do the same work in 12 days?

Sol. No. of men required for 24 days of work = 30 men

1 man do the work in days = 24×30

No. of men required for 12 days of work = $\frac{\cancel{24}^{2} \times 30}{\cancel{12}} = 60$ men

8) $a+b=b+a$ is called commutative law of addition.

9) Insert 3 rational numbers between 2/3 and 3/4.

Sol. Given numbers = $\frac{2}{3}$ and $\frac{3}{4}$

$= \frac{2}{3}, \frac{2+3}{3+4}, \frac{3}{4}$

$= \frac{2}{3}, \frac{5}{12}, \frac{3}{4}$

$= \frac{2}{3}, \frac{2+5}{3+12}, \frac{5}{12}, \frac{5+3}{12+4}, \frac{3}{4}$

$= \frac{2}{3}, \boxed{\frac{7}{15}, \frac{5}{12}, \frac{8}{16}}, \frac{3}{4}$

10) Simplify : $(12)^{-2} \times 4^3$

Sol. $(12)^{-2} \times 4^3$

$= (4 \times 3)^{-2} \times 4^3$

$= 4^{-2} \times 3^{-2} \times 4^3$

$= 4^{-2+3} \times 3^{-2}$

$= 4 \times 3^{-2}$

$= 4 \times \frac{1}{9} = \frac{4}{9}$

11) Write the following rational numbers in descending order:

8/7, -9/8, -3/2, 0, 2/5

Sol. 8/7, -9/8, -3/2, 0, 2/5

LCM of denominators

2 | 7, 8, 2, 5

2 | 7, 4, 1, 5

| 7, 2, 1, 5 LCM = 2 × 2 × 2 × 5 × 7 = 280

$\frac{8}{7} = \frac{320}{280}$, $\frac{-9}{8} = \frac{-315}{280}$, $\frac{-3}{2} = \frac{-420}{280}$,

$\frac{0}{1} = \frac{0}{280}$, $\frac{2}{5} = \frac{112}{280}$

Descending order → $\frac{8}{7}, \frac{2}{5}, 0, \frac{-9}{8}, \frac{-3}{2}$

12) Find the sum of additive inverse and multiplicative inverse of 7

Sol. Additive inverse of 7 = -7

Multiplicative inverse of 7 = 1/7

Sum = $\frac{-7+1}{7} = \frac{-49+7}{7} = \frac{-42}{7} = -6$

13) The perimeter of a triangle is $8y^2 - 9y + 4$ and it 2 sides are $3y^2 - 5y$ and $4y^2 + 12$. Find its third side.

Sol. Perimeter $= 8y^2 - 9y + 4$

1st side $= 3y^2 - 5y$

2nd side $= 4y^2 + 12$

3rd side $= 8y^2 - 9y + 4 - (3y^2 - 5y + 4y^2 + 12)$

$= 8y^2 - 9y + 4 - 3y^2 + 5y - 4y^2 - 12$

$= 8y^2 - 3y^2 - 4y^2 - 9y + 5y + 4 - 12$

$= 9y^2 - 4y - 8$

14) A can do a piece of work in 20 days and B in 15 days. They worked together on it for 6 days and then A left. How long will B take to finish the remaining work?

Sol. A can do a ~~piece~~ piece of work in = 20 days

B can do a piece of work in = 15 days

∴ A's 1-day work = $1/20$

∴ B's 1-day work = $1/15$

(A+B)'s 1-day work $= \frac{1}{20} + \frac{1}{15} = \frac{3+4}{60} = \frac{7}{60}$

(A+B)'s 6-days work $= \frac{7}{60} \times 6 = \frac{7}{10}$

Remaining work $= 1 - \frac{7}{10} = \frac{10-7}{10} = \frac{3}{10}$

B can do work in = 15 days

B can do $\frac{3}{10}$ work in $= \frac{15 \times 3}{10}$ days $= \frac{9}{2}$ days $= 4\frac{1}{2}$ days

15(i) At what ~~rate~~ rate per cent per annum will ₹630 produce an interest of ₹126 in 4 years?

Sol. $R = \frac{I \times 100}{P \times T} = \frac{126 \times 100}{630 \times 4} = 5\%$

ii) At what rate per cent per years will a sum double itself in 6 years?

Sol. Let the sum be 100

In 6 years (P+I) = 200

I = 100

$I = \frac{PRT}{100} \Rightarrow 100 = \frac{100 \times R \times 6}{100}$

$\Rightarrow R \times 6 = 100 \Rightarrow R = \frac{100}{6} = \frac{50}{3}$

16) Calculate the difference between the compound interest and simple interest on ₹7500 in 2 years and at 8% per annum.

Sol. $SI = \frac{PRT}{100} = \frac{7500 \times 8 \times 2}{100} = 1200$

∴ Interest for the 1st year $= \frac{7500 \times 8 \times 1}{100} = ₹600$

Amount at the end of 1st year = P + SI = 7500 + 600 = 8100

Principal for 2nd year = ₹8100

∴ Interest for the 2nd year $= \frac{8100 \times 8 \times 1}{100} = 648$

Total CI for 2 years = ₹600 + ₹648 = ₹1248

Difference between CI and SI for 2 years = ₹1248 − ₹1200

= ₹48

17) If the price of sugar is increased by 25% today, by what percent should it be decreased tomorrow to bring the price back to the original?

Sol. Let the price of sugar today be 100

Then its price tomorrow will be (100 + 25) = 125

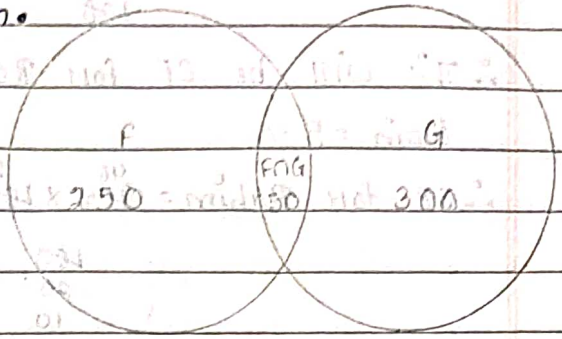
So, to bring back the price to normal, it should be decreased $= \frac{125 - 100}{125} \times 100 = \frac{25 \times 100}{125}$

$= 20\%$

18) In a group of 500 people, 250 can speak French and 300 can speak German. How many can speak both French and German. Represent it in Venn diagram.

Sol. $n(F) = 250$

$n(G) = 300$



19) John sold an article to Peter at 20% profit and Peter sold it to Mohan at 5% loss. If Mohan paid Rs. 912 for the article; find how much did John pay for it?

Sol. Mohan paid for the article = ₹912

∴ Peter sold the article to Mohan

∴ For Peter:

$SP = ₹912$

$Loss = 5\%$

$$CP = \frac{100}{(100 - loss\%)} \times SP = \frac{100}{(100-5)} \times 912 = ₹\frac{\cancel{100}^{20}}{\cancel{95}_{19}} \times \cancel{912}^{48} = ₹960$$

John sold the same article to Peter

∴ For John:

$SP = ₹960$

$Profit = 20\%$

$$CP = \frac{100}{(100 + Profit\%)} \times SP = \frac{100}{(100+20)} \times 960 = ₹\frac{100}{120} \times \cancel{960}^{8} = ₹800$$

Hence, John paid ₹800 for the article.

20) Rajesh sold his scooter to Rahim at 8% loss and Rahim, in turn, sold the same scooter to Ram at 5% gain. If Ram paid ₹14,490 for the scooter; find:

i) the SP and CP of the scooter for Rahim

ii) the SP and CP of the scooter for Rajesh

Sol. Let CP of the scooter for Rajesh = ₹100x

SP for Rajesh = $\frac{100x \times 92}{100} = 92x$

∴ This will be CP for Rahim = 92x

Gain = 5%

∴ SP for Rahim = $\frac{92x \times 105}{100} = \frac{966x}{10}$

This will be CP for Prem = ₹14,490

∴ $\frac{966x}{10} = 14490$

⇒ $x = \frac{14490}{966} \times 10 = 30 \times 5 = 150$

i) CP of scooter for Rahim = 92x = 92×150
= ₹13800

ii) SP of scooter for Rahim = $\frac{966x}{10} = \frac{966}{10} \times 150 = ₹14490$

iii) ∴ CP of scooter for Rajesh = 100x = 100×150 = ₹15000
SP of scooter for Rajesh = 92x = 92×150 = ₹13800

21) Insert 6 rational nos. between 5/6 and 8/9.

Sol. LCM of denominators 6 and 9 = 18

$\frac{5}{6} = \frac{15}{18}$ and $\frac{8}{9} = \frac{16}{18}$

Nos. $\frac{15}{18} = \frac{15 \times 7}{18 \times 7} = \frac{105}{126}$ and $\frac{16}{18} = \frac{16 \times 7}{18 \times 7} = \frac{112}{126}$

Required rational nos. between $\frac{5}{6}$ and $\frac{8}{9}$ are:

$\frac{106}{126}, \frac{107}{126}, \frac{108}{126}, \frac{109}{126}, \frac{110}{126}, \frac{111}{126}$

22) If $\sqrt{784} = 28$, find the value of :-

i) $\sqrt{7.84} + \sqrt{78400}$

Sol. $\sqrt{7.84} + \sqrt{78400}$

$= \sqrt{\frac{784}{10^2}} + \sqrt{784 \times 100}$

$= \frac{28}{10} + 28 \times 10$

$= 2.8 + 280 = 282.8$

ii) $\sqrt{0.0784} + \sqrt{0.000784}$

Sol. $\sqrt{0.0784} + \sqrt{0.000784}$

$= \sqrt{\frac{784}{10^4}} + \sqrt{\frac{784}{10^6}}$

$= \frac{28}{10^2} + \frac{28}{10^3}$

$= 0.28 + 0.028 = 0.308$

23) If John sells his bicycle for ₹637, he will suffer a loss of 9%. For how much should it be sold, if he desires a profit of 5%?

Sol. SP = ₹637

Loss = 9%

$\therefore CP = \frac{100 \times SP}{100 - 9} = \frac{100}{91} \times 637^{7} = ₹700$

Profit = 5%

$SP = \frac{(100 + Profit) \times CP}{100} = \frac{(100+5)}{100} \times 700 = 105 \times 7 = 735$

24) If 3 men / 6 boys can finish a work in 20 days, how long will 4 men and 12 boys take to finish the same work?

Sol. 3 men = 6 boys

4 men = $\frac{6^2}{3} \times 4 = 8$

Total boys in 2nd case :

= 4 men + 12 boys = 8 + 12 = 20 boys

6 boys can do a piece of work in 20 days
Then let 20 boys will do the work in x days.
$\therefore 6 : 20 :: 20 : x$
$\Rightarrow 6 : 20 :: x : 20$ (inverse proportion)
$\Rightarrow x = \frac{20 \times 6}{20} = 6$ days

25) A family of 5 persons can be maintained for 20 days with ₹2480. Find, for how long ₹6944 will maintain a family of 8 persons.

Sol. A family of 5 person can be maintained with ₹2480 for = 20 days
" " " " " " ₹1 for = 20×2480 days
" " " " " " ₹6944 for = $\frac{20}{2480} \times 6944$
$= 56$ days

A family of 1 person can be maintained = 56×5 days
A family of 8 persons can be maintained = $\frac{56 \times 5}{8}$ days = 35 days

26) Find the proper subsets of $\{x : x^2 - 9x - 10 = 0\}$

Sol. $x^2 - 9x - 10 = 0$
$\Rightarrow x^2 - 10x + x - 10 = 0$
$\Rightarrow x(x-10) + 1(x-10) = 0$
$\Rightarrow (x-10)(x+1) = 0$
$\therefore$ Either $x - 10 = 0 \Rightarrow x = 10$
Or $x + 1 = 0 \Rightarrow x = -1$
Given set $= \{-1, 10\}$
Proper subsets $= \phi, \{-1\}, \{10\}$