I- Indicate with ***justification*** the only the correct answer.

No.	Question	Expected answers		
		A	*B*	*C*
1.	If $f(x)=\frac{x-2}{x+2}$, then $f(-2)=$	0	-4	$f(x)$ doesn't exist
2.	*For* $x\neq 1, \frac{x-1}{1-x}=$	1	-1	*Not defined*
3.	$\frac{x-1}{x}$ vanishes for x	equals 1	equals 0	Does not equal to 0
4.	$g(x)=\frac{x+2}{x^2+2x}=\frac{1}{x}$, *for* $x\neq$	0	-2	0 & -2
5.	$\frac{3}{x}=\frac{x}{3}$ admits	One solution $x=3$	One solution $x=-3$	Two distinct solution $x=3$ *or* $x=-3$.
6.	$h(x)=\frac{x-2}{3x+2}$, *is valid for*	*all real values of x.*	*all natural values of x.*	*all no real values of x.*
7.	If $x-3^a=3^a+3^a$, then $x=$	9^a	3^{a+1}	3

II- Calculate the following:

a. $\frac{13}{12}\left(\frac{2}{21}-\frac{1}{15}\right)+\frac{33}{22}-\frac{220}{110}$.

b. $\left(-\frac{7}{5}+\frac{4}{3}\right)\div\left(7-\frac{4}{3}\right)$

c. $\frac{-5}{4}+\frac{7}{22}\times\frac{-33}{49}$.

d. $\left(1-\frac{5}{3}\right)\left(\frac{3}{5}+1-\frac{2}{3}\right)$.

III- For what values of x do the following fractions ***exist*** or ***valid***?

a. $\frac{x-4}{(3x-12)}$; *b.* $x-2$; *c.* $\frac{2x-5}{x^2+3x}$; *d.* $\frac{3x-7}{x+5}+\frac{1}{2x^2+10x}$;

e. $\frac{1}{2x}-\frac{3x}{x-5}+\frac{x+4}{x^2(x-5)}$; *f.* $\frac{7x+3}{2(4x-8)(x+1)}$; *g.* $\frac{3x}{x^2+4}$; *h.* $\frac{x-3}{x^2-2x}$.

IV- Express in the simplest form possible (***Specify condition of existence whenever needed***).

a. $\frac{2a}{3}+\frac{(a-1)}{2}$; *b.* $\frac{2x-3}{2xy-3y}-\frac{3xy-7y}{3y}$; *c.* $\frac{1}{x}-3x$

d. $\frac{1}{x-2}+\frac{1}{x+3}$; *e.* $\frac{3}{2x}-\frac{x}{(x-1)}$; *f.* $\frac{(a-3)}{(a+1)}-\frac{(a+1)}{(a-3)}$.

V- Simplify the following (Indicate for which values does the denominator ***vanish*** in each case):

a. $\frac{x}{x-3}-\frac{3}{x+2}-1$; *b.* $\frac{2}{5ab^2}-\frac{3}{4a^2b}$; *c.* $\frac{r+n}{r-n}\div 2(r+n)$;

d. $\frac{(2x-4)^2}{x(x+1)}\div\frac{(2x-4)^3}{(x+1)^2}$; *e.* $\frac{x}{y}\div\frac{1}{\frac{x}{y}}$;

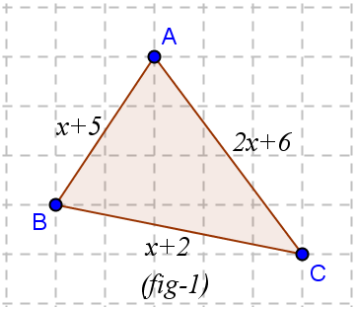
VI- Given $x+y=\frac{3}{2}\ \&\ xy=-5, calculate$:

a. $\frac{1}{y}+\frac{1}{x}$; *and* *b.* x^2y+y^2x.

VII- Consider the non-zero real numbers $m,n\ \&\ p$ such that: $\frac{1}{m}+\frac{1}{n}+\frac{1}{p}=0$.

Prove that $mn+mp+np=0$.

VIII- Consider the following figures: (figures are not to a scale)



(fig-1)

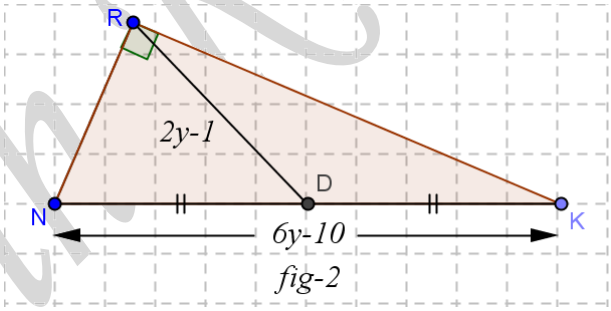


fig-2

a. Find the value of x for which each side of the triangle ABC exists.

b. Can you find value of x, so that triangle of *fig*-1 is isosceles of vertex C? Justify yourself.

c. Determine value of x,so that triangle of *fig*-1 is isosceles of vertex A.

d. Find value of y in *fig*-2.

IX- Find the numerical value of each expression if: $x=\frac{3}{5}$ *and* $y=\frac{-2}{7}$.

a. $\frac{1}{\frac{x}{y}}$; *b.* $\frac{1}{\frac{x}{y}}$; *c.* $\frac{x}{2}+\frac{y}{3}$; *d.* $\frac{\frac{x}{x+y}}{x}$; *e.* $(5x-7y)\div\frac{x}{y}$.

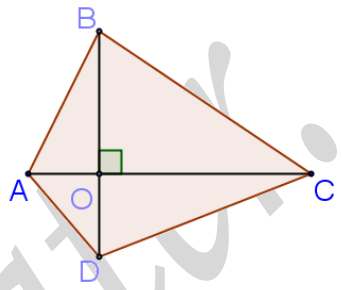
X- If we add the same number to both sides of the proper fraction $\frac{7}{9}$, the result will be $\frac{5}{6}$.

Find the added number.

XI- Consider the real non-zero numbers $a,b,c,x\ \&\ y$ such that: $\frac{1}{x}=\frac{1}{a}+\frac{1}{b}\ \&\ \frac{1}{y}=\frac{1}{c}-\frac{1}{a}$

Find in terms of $a,b\ \&\ c$ the value of $E=\frac{xy}{x+y}$.

XII- In the figure below, $ABCD$ is a quadrilateral with perpendicular diagonals that intersect at O, such that $AC = 6cm$, $AO = \dfrac{2^{11}+4^5}{2^{11}-4^5}$, $DO = \dfrac{\frac{2}{10}+\frac{2}{5}}{\frac{2}{3}\times\frac{9}{10}-\frac{2}{5}}$ and $BD = \dfrac{0.24\times 9}{5^{-2}\times 36\times 2^{-2}}$.



1) a) Prove that AO is a natural number to be determined.

   b) Verify that: $OD = \dfrac{BD}{2}$?

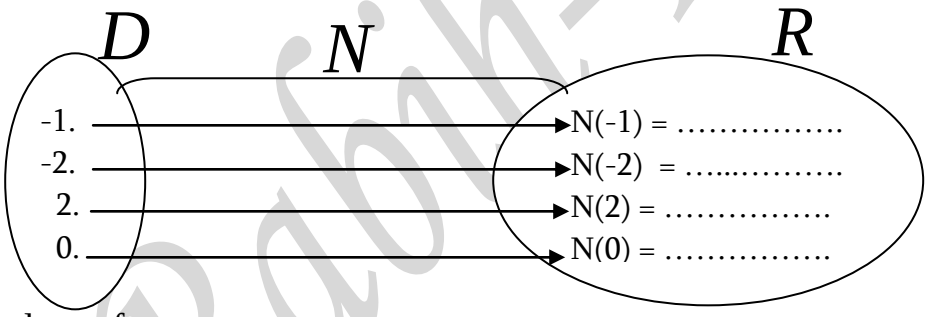
   c) Deduce the relative position of O with respect to $ABCD$.

2) Show that the quadrilateral $ABCD$ is a square.

XIII- Consider the expression: $N(x) = \dfrac{(2x+4)(x+1)}{(x+2)(x+3)}$

1) What does $N(x)$ represent? Justify.
2) Is 1 a root for $N(x)$? Justify.
3) Consider the two sets D & R, where D & R represent the set of values of x and the set of values of y respectively under the rule N.

   a. Copy and complete the diagram below:



   b. For what values of x:

      i. Does $N(x)$ admit an indeterminate form.

      ii. Does the denominator of $N(x)$ vanish?

   c. Deduce the domain of definition of $N(x)$.

   d. Use words or numbers from your own to write a complete statement containing: $N(x)$ and natural numbers.

XIV-Answer by true or false and justify your answer:

1) If $\boldsymbol{A(x) = \frac{2x-3}{3x-7} + \frac{2x-1}{x-2}}$, then ***A (0)*** does not exist.
2) If $E(x) = \dfrac{x+1}{x^2+1}$, then $E(x)$ exists for all real values x except -1 and 1