ASSIGNMENT FOR SUMMER VACATION.

SUB:- MATHEMATICS CLASS:- IX SESSION 2023-24

1. Complete Your Art Integrated Project

2. Complete the following Practice set in a separate copy.

PRACTICE SET – 1

1. Find 5 rational numbers between

(a) $\frac{2}{5}$ and $\frac{2}{3}$ $(b)\frac{1}{4}$ and $\frac{2}{3}$ $(c)2$ and 3 (d) $-\frac{2}{3}$ and 2

2. Find 3 irrational numbers between:-

(a) $\frac{1}{7}$ $and\frac{2}{7}$ $(b)\frac{2}{9}$ and $\frac{5}{9}$ $(c)\frac{2}{3}$ and $\frac{4}{5}$ (d) $\frac{2}{3}$ and $\frac{5}{6}$

3. Convert the following into simplest form

(I) $0.\overline{6}$ (ii) $0.\overline{45}$ (iii) $1.\overline{4}$ (iv) $2.\overline{124}$

(v) $0.1\overline{63}$ (vi)$0.\overline{324}$ (vii) $3.\ \overline{27}$

4. Classify the following number as rational or irrational:-

(i) $\sqrt{28}$ (ii) $\sqrt{625}$ (iii)0.5796 (iv) 7.978978……

(v) 2.2020020002…. (vi) $2+\sqrt{2}$ (vii) 1.212121… (viii) 1.212212221…..

(ix) $\sqrt{\frac{36}{64}}$ (x) $-\frac{9}{\sqrt{49}}$ (xi) $\frac{\sqrt{3}}{\sqrt{11}}$ (xii) $\frac{\sqrt{3}}{4}$

5. Simplify:-

(i) $(5\sqrt{2}+7\sqrt{3})(2\sqrt{2}-5\sqrt{3})$ $(ii)(6-8\sqrt{5}+3\sqrt{2})+(4-5\sqrt{2}+3\sqrt{5})$

$(iii)8\sqrt{3}+2\sqrt{3}$ $(iv)5\sqrt{2}\times 2\sqrt{10}\times 3\sqrt{15}$ $(v)(5+\sqrt{7})(2+\sqrt{5})$

6. Rationalize the denominator of the following:-

(i) $\frac{1}{\sqrt{2}}$ (ii) $\frac{4}{3\sqrt{2}}$ (iii)$\frac{1}{2+\sqrt{3}}$ (iv) $\frac{1}{7+3\sqrt{2}}$

(v) $\frac{3}{\sqrt{7}-\sqrt{6}}$ (vi) $\frac{5}{4\sqrt{3}-3\sqrt{2}}$ (vii)$\frac{30}{5\sqrt{3}-3\sqrt{5}}$ (Viii) $\frac{2}{2-\sqrt{3}}$

PRACTICE SET – 2

1. Write 4 examples of a rational number.

2. Write 4 examples of an irrational number.

3. Is zero a rational number?

4. Write four rational and four irrational numbers between $\frac{3}{5}$ and $\frac{3}{4}$

5. Find four rational and four irrational numbers between $\frac{3}{7}$ and $\frac{5}{7}$

6. Find Five rational numbers between $\frac{3}{5}$ and $\frac{2}{3}$.

7. Express the following in the form of $\frac{p}{q}$, where p and q are integers and $q \neq 0$

(a) $0.\overline{53}$ (b) $2.\overline{93}$ (c) 0.40777……. (d)$0.\overline{235}$

8. Express the following as a fraction in simplest form.

(a) . $2.\overline{36}+0.\overline{23}$ (b) $0.\overline{38}+1.\overline{27}$

9. Simplify the following:-

(a) $\sqrt{45} - 3\sqrt{20} + 4\sqrt{5}$ (b) $\frac{\sqrt{24}}{8} + \frac{\sqrt{54}}{9}$ (c) $4\sqrt{28} \div 3\sqrt{7} \div \sqrt[3]{7}$

(d) $(\sqrt{3} - \sqrt{2})^2$ (e) $\sqrt[4]{81} - 8\sqrt[3]{216} + 15\sqrt[5]{32} + \sqrt{225}$

(f) $3\sqrt{45} - \sqrt{125} + \sqrt{200} - \sqrt{50}$

10. Examine whether the following numbers are rational or irrational:-

(i) $(5 - \sqrt{5})(5 + \sqrt{5})$ (ii) $\left(\sqrt{3} + 2\right)^2$

(iii) $\frac{2\sqrt{15}}{3\sqrt{52} - 4\sqrt{117}}$ (iv) $\sqrt{8} + 4\sqrt{32} - 6\sqrt{2}$

11. Rationalise the denominator of the following:-

(a) $\frac{2}{3\sqrt{3}}$ (b) $\frac{\sqrt{40}}{\sqrt{3}}$ (c) $\frac{3+\sqrt{2}}{4\sqrt{2}}$ (d) $\frac{16}{\sqrt{41}-5}$ (e) $\frac{2+\sqrt{3}}{2-\sqrt{3}}$

(f) $\frac{\sqrt{6}}{\sqrt{2}+\sqrt{3}}$ (g) $\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$ (h) $\frac{3\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$ (i) $\frac{4\sqrt{3}+5\sqrt{2}}{\sqrt{48}+\sqrt{18}}$

12. Show that 0.142857142857..... = $\frac{1}{7}$

13. Represent the following on number line:-

(a) $\sqrt{2}$ (b) $\sqrt{5}$ (c) $2 + \sqrt{2}$ (d) $\sqrt{9.1}$

PRACTICE SET – 3

1. Give a example of two irrational number whose product is

(a) a rational number (b) an irrational number

2. Give an example of two irrational numbers whose quotient is

(a) a rational number (b) an irrational number

3. Find a pair of irrational numbers such that their sum is a rational number.

4. Give an example of two irrational numbers whose difference is a rational number.

5. Classify as rational or irrational:- (a) $\sqrt{15}$ (b) 0.4131313.....

(c) $\sqrt{41}$ (d) 1.232232223..... (e) $1.\overline{001}$ (f) $\frac{2}{\sqrt{3}}$ (g) $\sqrt{1.44}$

6. Express $\frac{4}{7}$ in decimal form and state the kind of decimal expansion.

7. Find the sum of $0.\overline{3}$ and $0.\overline{4}$.

8. Express $3\frac{4}{5}$ in decimal form and state the kind of decimal expansion.

9. Find three irrational numbers between $\frac{5}{7}$ and $\frac{9}{11}$.

10. Represent $0.\overline{235}$ in the form of $\frac{p}{q}$ where p and q are integers, $q \neq 0$.

11.If x = $3 + 2\sqrt{2}$, then find whether x + $\frac{1}{x}$ is a rational or irrational number.

12. For an irrational number x = $2 + \sqrt{3}$, find out the nature of the number x $- \frac{1}{x}$

13. Rationalise the denominator of $\frac{1}{(1+\sqrt{2}-\sqrt{5})}$

14. Simplify :- (a) $\frac{1}{\sqrt{5}+\sqrt{2}} + \frac{1}{\sqrt{5}-\sqrt{2}}$ (b) $\frac{3}{4\sqrt{5}-\sqrt{3}} + \frac{2}{4\sqrt{5}+\sqrt{3}}$

15. If a = $3 + \sqrt{8}$, then find the value of $a^2 + \frac{1}{a^2}$

16. Prove that $\frac{1}{\sqrt{4}+\sqrt{5}} + \frac{1}{\sqrt{5}+\sqrt{6}} + \frac{1}{\sqrt{6}+\sqrt{7}} + \frac{1}{\sqrt{7}+\sqrt{8}} + \frac{1}{\sqrt{8}+\sqrt{9}} = 1$

17. Show that $\frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} - \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2} = 5$

PRACTICE SET – 4

1. If $x = 1 - \sqrt{2}, find\ the\ value\ of$

$(a)x + \frac{1}{x}$ $(b)x - \frac{1}{x}$ $(c)x^2 + \frac{1}{x^2}$ $(d)x^4 + \frac{1}{x^4}$

2. Rationalise the denominator of (a) $\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$ (b) $\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}} + \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$

3.Find the value of a and b in each of the following, if a and b are rational numbers

(i) $\frac{2+\sqrt{3}}{2-\sqrt{3}} = a + b\sqrt{3}$ (ii) $\frac{3+\sqrt{2}}{3-\sqrt{2}}$ = a + b $\sqrt{2}$

(iii) $\frac{\sqrt{2}+\sqrt{3}}{3\sqrt{2}-2\sqrt{3}} = a - b\sqrt{6}$ (iv) $\frac{\sqrt{7}-1}{\sqrt{7}+1} - \frac{\sqrt{7}+1}{\sqrt{7}-1} = a + b\sqrt{7}$

(v) $\frac{4+3\sqrt{5}}{4-3\sqrt{5}} = a + b\sqrt{5}$ (vi) $\frac{5+2\sqrt{3}}{7+4\sqrt{3}} = a + b\sqrt{3}$

4. If x = 3 + $\sqrt{8}$, find the value of (a) $x + \frac{1}{x}$ (b) $x^2 + \frac{1}{x2}$ (c) $x^3 + \frac{1}{x3}$

5. Find the value of $\frac{1}{(3-\sqrt{8})} - \frac{1}{(\sqrt{8}-\sqrt{7})} + \frac{1}{(\sqrt{7}-\sqrt{6})} - \frac{1}{(\sqrt{6}-\sqrt{5})} + \frac{1}{(\sqrt{5}-2)}$

6. Rationalise the denominator in each of the following and hence taking$\sqrt{2} = 1.414$, $\sqrt{3}$ = 1.732 and $\sqrt{5}$ = 2.236, upto three places of decimal.

(a) $\frac{4}{\sqrt{3}}$ (b) $\frac{1}{\sqrt{2}}$ (c) $\frac{1}{\sqrt{5}}$ (d) $\frac{\sqrt{2}}{2+\sqrt{2}}$(e) $\frac{1}{\sqrt{3}+\sqrt{2}}$

7. If x = $\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$ and y = $\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$, then find the value of $x^2 + y^2$

8. If a = $\frac{2+\sqrt{5}}{2-\sqrt{5}}$ and b = $\frac{2-\sqrt{5}}{2+\sqrt{5}}$, then find the value of $a^2 - b^2$.

9. If x = $\frac{\sqrt{2}+1}{\sqrt{2}-1}$ and y = $\frac{\sqrt{2}-1}{\sqrt{2}+1}$, find the value of $x^2 + y^2 + xy$

10. Simplify:-

(a) $\frac{4+\sqrt{5}}{4-\sqrt{5}} + \frac{4-\sqrt{5}}{4+\sqrt{5}}$ (b) $\frac{7+3\sqrt{5}}{3+\sqrt{5}} - \frac{7-3\sqrt{5}}{3-\sqrt{5}}$ (c) $(7 + \sqrt{7})(7 - \sqrt{7})$

PRACTICE SET – 5

1. Solve the following:-

(a) $5^7 \times 5^4 \div 5^8$ $(b)4^{\frac{3}{2}} \times 125^{\frac{2}{3}}$

(c) $\left(\frac{81}{16}\right)^{-\frac{3}{4}} \times \left(\frac{25}{9}\right)^{-\frac{3}{2}} \times \left(\frac{2}{5}\right)^{-3}$ (d)$11^{\frac{1}{6}} \times 11^{\frac{1}{5}}$

(e)$\frac{(25)^{\frac{5}{2}} \times (729)^{\frac{1}{2}}}{(125)^{\frac{2}{3}} \times (27)^{\frac{2}{3}} \times (8)^{\frac{4}{3}}}$ (f)$(10000)^{\frac{1}{4}}$

2.Evaluate:-

(a) $\frac{4}{(216)^{-\frac{2}{3}}}+\frac{1}{(256)^{-\frac{3}{4}}}+\frac{2}{(243)^{-\frac{1}{5}}}$ (b) $(1^3 + 2^3 + 3^3)^{\frac{1}{2}}$

(c) $\frac{2^{30}+2^{29}+2^{28}}{2^{31}+2^{30}-2^{29}}$ (d) $\left(\frac{64}{125}\right)^{-\frac{2}{3}}+\left(\frac{256}{625}\right)^{-\frac{1}{4}}+\left(\frac{3}{7}\right)^{0}$

3. Find the value of x if

(a) $x^{\frac{1}{12}} = 49^{\frac{1}{24}}$ (b) $(125)^x = \frac{25}{5^x}$

(c) $\sqrt[5]{5x+2} = 2$ (d) $5^{x-2} \times 3^{2x-3} = 135$

(e) $\sqrt[3]{3x-2} = 4$ (g) $2^{2x+2} = 2^{3x-1}$

4. Prove that $\left(\frac{x^b}{x^c}\right)^{b+c-a} \times \left(\frac{x^c}{x^a}\right)^{c+a-b} \times \left(\frac{x^a}{x^b}\right)^{a+b-c} = 1$

5. Arrange in ascending order of their magnitudes:-

(a) $\sqrt{3}$, $\sqrt[3]{4}$, $\sqrt[4]{6}$ (b) $\sqrt[3]{18}$, $\sqrt[6]{144}$, $\sqrt{6}$

(c) $\sqrt{3}$, $\sqrt[3]{6}$, $\sqrt[4]{10}$ (d) $\sqrt[3]{4}$, $\sqrt[4]{6}$, $\sqrt[6]{17}$

6. Simplify:-

(a) $\frac{x^{a+b}.x^{b+c}.x^{c+a}}{\left(x^a.x^b.x^c\right)^2}$ (b) $\frac{\left(x^{a+b}\right)^{a-b}.\left(x^{b+c}\right)^{b-c}}{(x^{a+c})^{a-c}}$

7. Prove that:

(i) $\left(\frac{x^a}{x^b}\right)^{a^2+ab+b^2}.\left(\frac{x^b}{x^c}\right)^{b^2+bc+b^2}.\left(\frac{x^c}{x^a}\right)^{c^2+ca+a^2} = 1$

(ii) $\sqrt{x^{-1}y}\,.\,\sqrt{y^{-1}z}\,.\,\sqrt{z^{-1}x} = 1$

(iii) $\frac{1}{1+a^{x-y}}+\frac{1}{1+a^{y-x}} = 1$

8. Solve the equation:- $2^{2x+2} = 2^{3x-1}$

9. If $(x + y)^{-1}(x^{-1} + y^{-1}) = x^p.y^q$, prove that $p + q + 2 = 0$

10. If $\sqrt[5]{\sqrt[4]{x^{20}}} = x^p$, find the value of p.

11. If $a^x = b^y = c^z$ and $b^2 = ac$, prove that $\frac{1}{x}+\frac{1}{z}=\frac{2}{y}$

12. Solve for x:-

(a) $\left(\frac{1}{7}\right)^{4-2x} = \sqrt{7}$ (b) $(0.2)^{2x-1} = 1$

PRACTICE SET – 6

1. Among the following expressions, which are polynomial of a single variable and which are not?

(i) $4x^2 - 3x + 7$ (ii) $\sqrt{3}\,x^2 + 5x - 2$ (iii) $3\sqrt{t} + t\sqrt{2}$

(iv) $y + \frac{1}{y^2} + 3$ (v) $x^{10} + y^3 + t^{10}$ (vi) $2x^{10} + y^5 + z$

2. Find the coefficient of x^2 in each of the following:-

(i) $2x^3 + x^2 + x$ (ii) $5 - 7x^2 + x^3 + 2$ (iii) $\frac{\pi}{2} x^2 + x - 1$

(iv) $\sqrt{2}\, x - 1$ (v) $(x - 1)(x + 1)$ (vi) $(3x - 2)^2$

3. Find the degree of each of the following polynomials:-

(a) $5x^4 + 4x^3 + 10$ (b) $4 - 4y^2 + 5y + 2$ (c) $t^3 - 5$

(d) $5x^4 + 4x^3 + 10$ (e) 20 (f) 0 (g) $z^5 - 2z^7 + 5$

4. Which of the following polynomial are linear, quadratic and cubic?

(i) $x^2 - x$ (ii) 3 (iii) $3x^2 - 5$ (iv) $5x^2 + 6x + 2$

5. Write the values of the polynomial $5x^2 - 2x + 2$ at

(i) x = 0 (ii) x = 1 (iii) x = - 3

6. For each of the following polynomial, find p(0) and p(1)

(i) $p(y) = y^2 + y + 2$ (ii) $p(t) = 5 + t + 2t^2 - t^4$

(iii) $p(x) = (x - 2)(x + 2)$ (iv) $p(x) = 2x^3 + 3x^2 - 1$

7. Find the value of the polynomial p(x) at x = a when

(i) $p(x) = 3x^2 + 8x + 4$ and a = - 2 (ii) $p(x) = x^2 + x - 6$ and a = - 3

(iii) $p(x) = x^3 - 2x + 2$ and a = - 1 (iv) $p(x) = x^3 - 3x^2 + x$ and x = - 1

7. If $p(x) = x^2 - 5x + 4$ and $q(x) = x^3 + 1$. Find the values of the following:-

(i) $p(1) \times q(1)$ (ii) $\frac{p(1)}{q(1)}$ (iii) p(2) + q(2)

PRACTICE SET – 7

1. Give an example of :- (i) a binomial of degree 25

(ii) a monomial of degree 37 (iii) a trinomial of degree 11

2. Find the value of the polynomial $3x^2 - 2x + 8$ at

(i) x = 0 (ii) x = 2 (iii)x = -2

3. If $f(m) = 2m + 8 - 5m^2$; find the value of:

(i) f(-2) (ii) f(3) (iii) f(0)

4. Use the Remainder theorem to find the remainder when $2x^3 + 3x^2 - 5x + 7$ is divided by:

(i) x + 1 (ii) x – 2 (iii)2x - 1 (iv) $x + \pi$ (v) 2x + 1

5. Find the value of k if

(a) (x -1) is factor of $p(x) = kx^2 - 3x + k$

(b) x- 2 is a factor of $x^3 - 2kx^2 + kx - 1$

6. Show that:-

(i) $(2x – 3)$ is a factor of $2x^3 – 9x^2 + x + 12$

(ii) $(x + 2)$ is a factor of $x^4 – x^2 - 12$

(iii) $(x + 1)$ and $(2x – 3)$ are factors of $2x^3 – 9x^2 + x + 12$

(iv) $(x-1)$ is a factor of $x^{10} – 1$ and also of $x^{11} – 1$

7. Without doing actual division prove that $2x^4 – 6x^3 + 3x^2 + 3x – 2$ is exactly divisible by $x^2 - 3x + 2$.

PRACTICE SET – 8

A. Factorise:-

(i) $x^2 + 15x + 26$

(ii) $x^2 + 9x + 20$

(iii) $y^2 + 18y + 65$

(iv) $p^2 + 14p + 13$

(v) $y^2 + 4y – 21$

(vi) $y^2 – 2y – 15$

(vii) $18 + 11x + x^2$

(viii) $x^2 – y^2 + 6y – 9$

(ix) $x^2 = 17x + 60$

(x) $x^2 + 4x – 77$

(xi) $y^2 + 7y + 12$

(xii) $p^2 – 13p – 30$

(xiii) $a^2 – 16a – 80$

(xiv) $2x^2 – x – 15$

(xv) $y^2 – 15y + 56$

(xvi) $x^2 – 33x + 90$

(xvii) $a^2 + 5a – 36$

(xviii) $4x^2 + 17x – 15$

(xix) $2y^2 – 19y + 44$

(xx) $6a^2 – 13ab + 2b^2$

(xxi) $(x – 2y)^2 – 5(x – 2y) + 6$

(xxii) $6 – x – x^2$

(xxiii) $49 – 64k^2$

(xxiv) $49x^2 – 36y^2$

(xxv) $\frac{2p^2}{25} - 32q^2$

(xxvi) $y^3 - \frac{y}{9}$

(xxvii) $\frac{x^2}{25} - 625$

(xxviii) $\frac{x^2}{8} - \frac{y^2}{18}$

(xxix) $\frac{4x^2}{9} - \frac{9y^2}{16}$

(xxx) $\frac{x^3y}{9} - \frac{xy^3}{16}$

(xxxi) $1331x^3y – 11y^3x$

(xxxii) $\frac{x^2}{9} - \frac{y^2}{25}$

(xxxiii) $x^3 – x$

(xxxiv) $9(a – b)^2 – 16(a + b)^2$

(xxxv) $25x^2 – 10x + 1 – 36z^2$

(xxxvi) $16(2x – 1)^2 – 25z^2$