

UNIT 3- REVIEW FOR TEST

Which values of x , when substituted into the function $y = \frac{x-4}{2x^2+8x}$, would make it undefined?

- ~~(1)~~ $x = 2$ and 8
- ~~(3)~~ $x = -4$ and 4
- ~~(2)~~ $x = -4$ and 8
- (4)** $x = -4$ and 0

$$2x^2 + 8x = 0$$

$$2x(x+4) = 0$$

$$x=0 \quad x=-4$$

2) Which of the following is equivalent to $\frac{10x^6y^3}{15x^2y^6}$?

$$\frac{2x^4}{3y^3}$$

- (1) $\frac{2x^3}{3y^2}$
- (3)** $\frac{2x^4}{3y^3}$

- (2) $\frac{3x^8}{2y^9}$
- (4) $\frac{3x^2}{2y^3}$

3) Which of the following is equivalent to $\frac{2x-10}{25-x^2}$?

$$-1 \frac{2(x-5)}{(5-x)(5+x)}$$

- (1)** $\frac{-2}{x+5}$
- ~~(3)~~ $\frac{x+5}{2}$

- ~~(2)~~ $\frac{2-x}{5}$
- ~~(4)~~ $\frac{2}{x-5}$

4) Which of the following is equivalent to $\frac{\frac{1}{x-1} - \frac{1}{x}}{\frac{1}{x^2-x}}$?

$$\frac{x(x-1) \left(\frac{1}{x-1} - \frac{1}{x} \right)}{x(x-1) \left(\frac{1}{x^2-x} \right)}$$

$$\frac{x - (x-1)}{1} = 1$$

- (1)** 1
- (3) $\frac{x}{x-1}$

- (2) $\frac{2}{x-1}$
- (4) $x-x^2$

5) What is the solution set of the equation $\frac{x}{x-4} - \frac{1}{x+3} = \frac{28}{x^2-x-12}$?

- (1) {4} (3) {29}

$$x(x+3) - 1(x-4) = 28$$

- (2) {4, -6}

(4) {-6}

$$x^2 + 3x - x + 4 = 28$$

$$x^2 + 2x - 24 = 0$$

$$(x-4)(x+6) = 0$$

$$x = -6$$

6) It takes Brad 2 hours to mow his lawn. It takes Kris 3 hours to mow the same lawn. At the same pace, how long would it take them to mow the lawn if they do the job together?

- (1) $2\frac{1}{2}$ hours

(3) $1\frac{1}{5}$ hours

$$\frac{1}{2} + \frac{1}{3} = \frac{1}{x}$$

$$x = \frac{6}{5} = 1.2 = 1\frac{1}{5}$$

- (2) $1\frac{1}{6}$ hours

- (4) $\frac{5}{6}$ hours

$$3x + 2x = 6$$

$$5x = 6$$

Simplify each rational expression. State any value(s) that would make each fraction *undefined*.

7) $\frac{ab-bc}{a-c} \cdot \frac{b(a-c)}{(a-c)} = \boxed{b, a \neq c}$

8) $\frac{9-y^2}{4y-12} = \frac{(3-y)(3+y)}{4(y-3)}$

$$= \frac{-1(3+y)}{4} = \boxed{\frac{-3-y}{4}}$$

 where $x \neq 3$

9) $\frac{x^3+2x^2-4x-8}{(x+2)^2}$

$$\frac{x^2(x+2) - 4(x+2)}{(x^2-4)(x+2)}$$

$$\frac{(x+2)(x-2)(x+2)}{(x+2)(x+2)}$$

$$= \boxed{x-2 \text{ where } x \neq -2}$$

10) SOAP!

$$\frac{8x^3-1}{4x^2-1} = \frac{(2x-1)(4x^2+2x+1)}{(2x+1)(2x-1)}$$

$$= \boxed{\frac{4x^2+2x+1}{2x+1}}$$

 where $x \neq -\frac{1}{2}$

Simplify each of the following complex fractions.

$$11) \frac{x \left(\frac{x-4}{x} \right)}{x \left(\frac{2+x}{x} \right)} = \frac{x^2-4}{2+x} = \frac{\cancel{x+2}(x-2)}{2+x}$$

$$= \boxed{x-2, x \neq -2}$$

$$12) \frac{rs^2 \left(\frac{1-\frac{1}{s}}{r} \right)}{rs \left(\frac{r^2-s^2}{s^2-1} \right)} = \frac{s^2-s}{r^3-rs^2} = \frac{s(s-1)}{r(r^2-s^2)}$$

$$= \boxed{\frac{s(s-1)}{(r+s)(r-s)}}$$

$$13) \frac{x^2 \left(\frac{1+\frac{2}{x}-\frac{35}{x^2}}{1-\frac{3}{x}-\frac{10}{x^2}} \right)}{x^2 \left(\frac{1-\frac{3}{x}-\frac{10}{x^2}}{1-\frac{3}{x}-\frac{10}{x^2}} \right)} = \frac{x^2+2x-35}{x^2-3x-10} = \frac{(x+7)(x-5)}{(x-5)(x+2)}$$

$$= \boxed{\frac{x+7}{x+2}, x \neq 5, -2}$$

$$\frac{5x-15}{x^2-9} = \frac{5(x-3)}{(x+3)(x-3)}$$

$$= \boxed{\frac{5}{x+3}, x \neq 3, -3}$$

Solve the following rational equation.

$$15) \left(\frac{2}{x} + \frac{1}{5} = \frac{12}{5x} \right)$$

$$10 + x = 12$$

$$\boxed{x=2}$$

$$16) \left(\frac{3}{x^2+x-2} + \frac{3}{x-1} = \frac{1}{x+2} \right)$$

$$3 + 3(x+2) = 1(x-1)$$

$$3 + 3x + 6 = x - 1$$

$$3x + 9 = x - 1$$

$$-x - 9 = -x - 9$$

$$2x = -10$$

$$\boxed{x=-5}$$

$$2b^2 \cdot \left(\frac{b^2 - b - 6}{b^2} - \frac{2b + 12}{b} = \frac{b - 39}{2b} \right)$$

$$2(b^2 - b - 6) - [2b(2b + 12)] = b(b - 39)$$

$$2b^2 - 2b - 12 - [4b^2 + 24b] = b^2 - 39b$$

$$2b^2 - 2b - 12 - 4b^2 - 24b = b^2 - 39b$$

$$-2b^2 - 26b - 12 = b^2 - 39b$$

$$+2b^2 + 26b + 12 + 2b^2 + 26b + 12$$

$$\Rightarrow 3b^2 - 13b + 12 = 0$$

$$3b^2 + 9b + 4b + 12$$

$$3b(b+3) \quad 4(b+3)$$

$$(3b+4)(b+3)$$

$b = -\frac{4}{3}$	$b = -3$
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**18) Consider the rational equation: $\frac{1}{R} = \frac{1}{x} + \frac{1}{y}$

Solve for x in terms of R and y.

$$xy = Ry + Rx$$

$$\frac{xy}{y+x} = \frac{R(y+x)}{y+x}$$

$$R = \frac{xy}{y+x}$$

19) Prove algebraically: $\frac{x^3 + 18}{x^3 + 1} = 1 + \frac{17}{x^3 + 1}$

$$x^3 + 18 = x^3 + 1 + 17$$

$$x^3 + 18 = x^3 + 18 \quad \checkmark$$

20) Suppose that Huck Finn can paint a fence in 5 hours. If Tom Sawyer helps him paint the fence, they can do it together in 3 hours. How long would it take for Tom to paint the fence by himself?

$$15x \left(\frac{1}{5} + \frac{1}{x} = \frac{1}{3} \right)$$

$$x = 7.5$$

$$3x + 15 = 5x$$

$$15 = 2x$$

Solve each equation for x.

$$21) \sqrt{2x-1}-3=4$$

$$\begin{array}{r} +3 \quad +3 \\ \hline (\sqrt{2x-1})^2 = (7)^2 \end{array}$$

$$2x-1=49$$

$$2x=50$$

$$x=25$$

check:

$$\sqrt{2(25)-1}-3=4$$

$$\sqrt{49}-3=4$$

$$7-3=4$$

$$4=4 \checkmark$$

NO SOLUTION!

$$22) (\sqrt{x+8})^2 = (-4)^2$$

$$x+8=16$$

$$x=8$$

check:

$$\sqrt{8+8} = -4$$

$$\sqrt{16} \neq -4$$

NO SOLUTION

$$23) (3\sqrt{x+2})^2 = (2\sqrt{x+7})^2$$

$$9(x+2) = 4(x+7)$$

$$9x+18 = 4x+28$$

$$5x = 10$$

$$x=2$$

check: $3\sqrt{2+2} = 2\sqrt{2+7}$

$$3\sqrt{4} = 2\sqrt{9}$$

$$3(2) = 2(3) \checkmark$$

$$24) \sqrt[3]{2x-1}+6=4$$

$$\begin{array}{r} -6 \quad -6 \\ \hline (\sqrt[3]{2x-1})^3 = (-2)^3 \end{array}$$

$$2x-1 = -8$$

$$\begin{array}{r} +1 \quad +1 \\ \hline \end{array}$$

$$\frac{2x}{2} = \frac{-7}{2}$$

$$x = -3.5$$

check:

$$\sqrt[3]{2(-3.5)-1} + 6 = 4$$

$$\sqrt[3]{-8} + 6 = 4$$

$$-2 + 6 = 4$$

$$4 = 4 \checkmark$$

$$25) \sqrt{x+5}+x=7$$

$$\begin{array}{r} -x \quad -x \\ \hline (\sqrt{x+5})^2 = (7-x)^2 \end{array}$$

$$x+5 = (7-x)(7-x)$$

$$= 49 - 7x - 7x + x^2$$

$$x+5 = 49 - 14x + x^2$$

$$\begin{array}{r} -x-5 \quad -5-x \\ \hline \end{array}$$

$$x^2 - 15x + 44 = 0$$

$$(x-11)(x-4) = 0$$

* 11

check

$$\sqrt{11+5}+11=7$$

$$\sqrt{16}+11=7$$

$$4+11=7$$

$$15 \neq 7$$

NO!

4

check

$$\sqrt{4+5}+4=7$$

$$\sqrt{9}+4=7$$

$$3+4=7$$

$$7=7 \checkmark$$

$x=4$

Cumulative Review:

26) What type of relationship is satisfied by the following set of data? Explain.

X	0	1	2	3	4
Y	7	10	13	16	19

$\begin{matrix} \swarrow & \swarrow & \swarrow & \swarrow \\ +3 & +3 & +3 & +3 \end{matrix}$

Linear b/c the y's increase by a constant #

27) Solve by using long division and express solution with a rational remainder:

$$\frac{x^3 - 3x^2 + 5x - 15}{x + 2}$$

$$x + 2 \overline{) x^3 - 3x^2 + 5x - 15}$$

$$\underline{-x^3 + 2x^2}$$

$$-5x^2 + 5x$$

$$\underline{+5x^2 + 10x}$$

$$15x - 15$$

$$\underline{-15x + 30}$$

$$-45$$

$$x^2 - 5x + 15 - \frac{45}{x+2}$$

check w/
Remainder Theorem!
 $(-2)^3 - 3(-2)^2 + 5(-2) - 15 = -45 \checkmark$

28) Multiply.

$(3x\sqrt{2} + 2y)(3x\sqrt{2} - 2y)$ * conjugate! *

$$9x^2(\sqrt{2})^2 - 6xy\sqrt{2} + 6xy\sqrt{2} - 4y^2$$

$18x^2 - 4y^2$

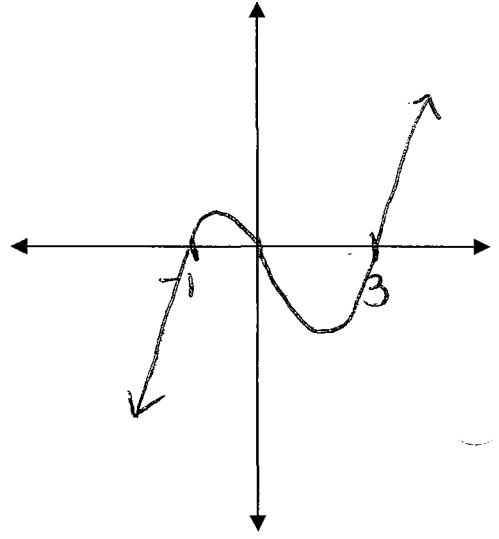
29) Write a polynomial equation whose zeros are $x = -1$, $x = 0$, and $x = 3$.

$$y = x(x+1)(x-3)$$

$$(x^2+x)(x-3)$$

$$x^3 - 3x^2 + x^2 - 3x$$

$y = x^3 - 2x^2 - 3x$



30) For #29 describe the end behavior of the polynomial and sketch the graph.

EB: low, high zeros = -1, 0, 3
 y-int = 0