

5 out of 25 from previous test.

Math-I 110 Test #4 In Class Review

Topics: Exponents, Radicals, Factoring, Rationalizing, Polynomial Models, Quadratic Functions, Applications

1. Find all square roots of the number: 2,025.
2. Simplify. Assume all variables represent nonnegative values: $\sqrt{a^{12}}$.
3. Simplify: $\sqrt[3]{-\frac{8}{27}}$
4. Write an equivalent expression using radical notation: $n^{\frac{3}{5}}$.
5. Rewrite using exponential notation: $\sqrt[4]{x^9}$
6. Simplify using the laws of exponents (no negative exponents): $(4p^2q^{-3})^{\frac{3}{2}}$.
7. Simplify by factoring: $\sqrt[3]{27x^7y^{10}}$.
8. Simplify by taking the roots of numerator and denominator: $\sqrt{\frac{9x^2y^4}{25}}$.
9. Rationalize the denominator: $\sqrt{\frac{4}{3}}$.
10. Find a polynomial $f(x)$ with zeros at $f(1) = 0, f(-2) = 0, f(4) = 0$ and $f(0) = 8.$

f becomes 0 at $x = 1, x = -2, x = 4$

$(x-1)$ should be a factor of $f(x) \Rightarrow f(x) = (x-1)(\dots)$

$$1-1=0$$

$$x=4 \Rightarrow$$

$x=-2 \Rightarrow (x+2)$ should be a factor and $(x-4)$ should be a factor.

$$\Rightarrow f(x) = (x-1)(x+2)(x-4)(\dots)$$

cannot have any linear factors

only zeros are $x=1, x=-2, x=4$

$$\Rightarrow f(x) = a(x-1)(x+2)(x-4)$$

$$f(0) = 8 \Rightarrow a(0-1)(0+2)(0-4) = 8$$

$$\Rightarrow a(-1)(2)(-4) = 8$$

$$\Rightarrow 8a = 8 \Rightarrow a = 1$$

$$\Rightarrow f(x) = (x-1)(x+2)(x-4)$$

$$= (x-1)(x^2 + 2x - 4x - 8)$$

$$= (x-1)(x^2 - 2x - 8)$$

$$= x(x^2 - 2x - 8) - 1(x^2 - 2x - 8)$$

$$= x^3 - 2x^2 - 8x - x^2 + 2x + 8$$

$$\Rightarrow f(x) = x^3 - 3x^2 - 6x + 8$$

11. Projectile Motion: A ball is thrown upward from the ground with an initial velocity of 80 ft/sec.
 $h(t) = -16t^2 + 80t$. Find how many seconds before it hits the ground. Round to the nearest tenth.

12. Solve and find the sum of the x-values: $x^2 - 5x + 6 = 0$.

$$x^2 - 5x + 6 = 0 \Rightarrow (x-2)(x-3) = 0 \Rightarrow x = 2 \text{ or } 3$$

$$\text{Sum} = 2 + 3 = 5$$

13. Find the x-intercepts: $f(x) = 5x^2 - 18x + 9$.

$$f(40)$$

14. Let $f(x) = (x - 5)^2 - 9$. Find x so that $f(x) = 40$.

$$(x-5)^2 - 9 = 40$$

$$\Rightarrow (x-5)^2 = 49$$

$$\Rightarrow x-5 = \pm 7$$

15. Solve: $3x^2 - 2x - 1 = 0$. $\rightarrow a=3, b=-2, c=-1$

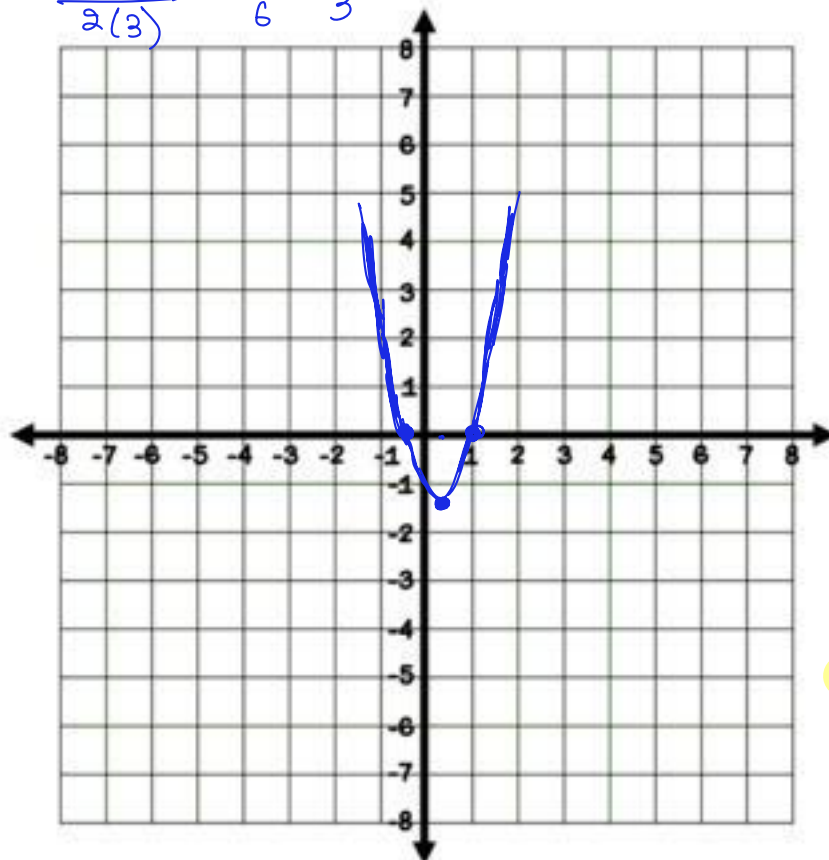
$$\text{Vertex at } x = \frac{-(-2)}{2(3)} = \frac{2}{6} = \frac{1}{3} = h$$

$$k = 3\left(\frac{1}{3}\right)^2 - \frac{2}{3} - 1$$

$$= \frac{1}{3} - \frac{2}{3} - 1$$

$$= -\frac{4}{3}$$

$$\left(\frac{1}{3}, -\frac{4}{3}\right)$$



$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(-1)}}{2(3)}$$

$$= \frac{2 \pm \sqrt{4+12}}{6}$$

$$= \frac{2 \pm \sqrt{16}}{6}$$

$$= \frac{2 \pm 4}{6}$$

$$= \frac{2+4}{6} \text{ or } \frac{2-4}{6}$$

$$= 1 \text{ or } -\frac{1}{3}$$

16. Graph of $f(x) = (x + 3)^2 - 2$.

17. Without graphing, find the vertex: $f(x) = -\frac{6}{7}(x - 7)^2 + 9$.

18. Without graphing, find the maximum or minimum value: $f(x) = -(x + 7)^2 - 9$.
 $= a(x-h)^2 + k$
 $a = -1, h = -7, k = -9 \Rightarrow \text{vertex at } (-7, -9)$
 $a < 0 \Rightarrow \text{max.} \Rightarrow \text{maximum value} = k = -9$

19. Write the equivalent form $f(x) = a(x - h)^2 + k$ for $f(x) = 2x^2 - 12x + 20$.

20. Application: The cost (in dollars) of producing x gadgets is given by $C = 4x^2 - 64x + 320$.
How many gadgets should be produced to minimize the cost?

$C(x) = 4x^2 - 64x + 320$
 $a = 4, b = -64, c = 320$
 $a > 0 \Rightarrow \text{min. at } x = \frac{-b}{2a} = \frac{-(-64)}{2(4)} = 8$
 $\Rightarrow 8 \text{ gadgets should be produced.}$

Math-I 110 Test #4 IN Class Review — Answer Key

1. ± 45

11. $t = 5.0 \text{ s}$

2. a^6

12. *Roots* 2, 3; *sum* = 5

3. $-\frac{2}{3}$

13. x-intercepts at (3, 0) and $(\frac{3}{5}, 0)$

4. $\sqrt[5]{n^3}$

14. $x = 12$ *or* $x = -2$

5. $x^{\frac{9}{4}}$

15. $x = 1$ *or* $x = -1/3$

6. $\frac{8p^3}{q^2}$

16. vertex (-3, -2)

7. $3x^2y^3\sqrt[3]{xy}$

17. Vertex (7, 9)

8. $\frac{3xy^2}{5}$

18. Maximum value -9 at $x = -7$

9. $\frac{2\sqrt{3}}{3}$

19. $f(x) = 2(x - 3)^2 + 2$

10. $f(x) = x^3 - 3x^2 - 6x + 8$

20. $x = 8$ (minimizes cost)

Quiz 10

① Let $f(x) = x^2 - 10x + 24$

10pts write the vertex form of equation
 $\rightarrow a(x-h)^2 + k$

② Let $f(x) = -x^2 + 5x - 6$

10pts Find whether $f(x)$ has a min or a max.

Find value of x at which min or max occurs.

$$a=1, b=-10, c=24$$

① $\rightarrow h = \frac{-b}{2a} = \frac{-(-10)}{2(1)} = 5$

$$\Rightarrow f(x) = (x-5)^2 - 1$$

$$k = f(5) = 5^2 - 10(5) + 24 = -1$$

② $a = -1 < 0 \Rightarrow \text{max}$

$$\Rightarrow x = \frac{-b}{2a} = \frac{-5}{2(-1)} = \frac{5}{2}$$