Honors Math 2 Name Key

Test 5 Review

Solve each equation over the set of complex roots.

1) $(x-2)(3x+1)=0$

$x-2=0$ $\quad 3x+1=0$

$\boxed{x=2}$ $\quad \boxed{x=-\frac{1}{3}}$

2) $0=x(x-3)$

$\boxed{x=0}$ $\quad x-3=0$

$\boxed{x=3}$

3) $2(x+12)(5x-2)=0$

$x+12=0$ $\quad 5x-2=0$

$\boxed{x=-12}$ $\quad \boxed{x=\frac{2}{5}}$

4) $x^2+8=5x+2$

$x^2-5x+6=0$

$(x-2)(x-3)=0$

$x-2=0$ $\quad x-3=0$

$\boxed{x=2}$ $\quad \boxed{x=3}$

5) $\cancel{8}-2x^2=32$

$\cancel{-8}$ $\quad -8$

$-2x^2=24$

-2 $\quad -2$

$\sqrt{x^2}=\sqrt{-12}$ $\quad 4$ $\quad 3$ $\quad 2$

$\boxed{x=\pm 2i\sqrt{3}}$

6) $4(x-3)^2-6=42$

$+6$ $\quad +6$

P
E
MD
AS

$\frac{4(x-3)^2}{4}=\frac{48}{4}$

$\sqrt{(x-3)^2}=\sqrt{12}$ $\quad 4$ $\quad 3$ $\quad 2$

$x-3=\pm 2\sqrt{3}$

$\boxed{x=3\pm 2\sqrt{3}}$

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

$x^2+8x+16=-2+16$

$\sqrt{(x+4)^2}=\sqrt{14}$

$x+4=\pm\sqrt{14}$

$\boxed{x=-4\pm\sqrt{14}}$

8) $5x^2-8x-4=0$

$(5x+2)(x-2)=0$

$2x$

$-10x$

$5x+2=0$ $\quad x-2=0$

$\boxed{x=\frac{-2}{5}}$ $\quad \boxed{x=2}$

9) $3=4x^2-8x+8$

$0=4x^2-8x+5$

$a=4$ $\quad b=-8$ $\quad c=5$

$x=\frac{8\pm\sqrt{64-4(4)(5)}}{8}$

$x=\frac{8\pm\sqrt{64-80}}{8}$

$x=\frac{8\pm\sqrt{-16}}{8}=\frac{8\pm 4i}{8}=\boxed{\frac{2\pm i}{2}}$

Determine the x-and y-intercepts of each of the following functions.

y-int: Plug in '0' for x and solve for y.

x-int: Plug in '0' for y and solve for x.

10) $y=\frac{1}{2}(x-6)^2-3$

$\boxed{\text{y-int } (0,15)}$

$y=\frac{1}{2}(0-6)^2-3$

$y=15$

$\boxed{\text{x-int } (6+\sqrt{6},0) \,\&\, (6-\sqrt{6},0)}$

$0=\frac{1}{2}(x-6)^2-3$

$\frac{1}{2}(x-6)^2-3=0$

$2 \cdot \frac{1}{2}(x-6)^2=3 \cdot 2$

$\div\frac{1}{2}$

$\cdot 2$

P
E
MD
AS

$\sqrt{(x-6)^2}=\sqrt{6}$

$x-6=\pm\sqrt{6}$

$x=6\pm\sqrt{6}$

11) $y=2x^2-6x+20$

$\boxed{\text{y-int: } (0,20)}$

x-int: None

$\frac{0}{2}=\frac{2x^2}{2}-\frac{6x}{2}+\frac{20}{2}$

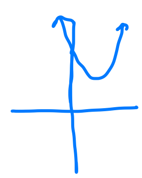
$0=x^2-3x+10$

$x=\frac{3\pm\sqrt{9-4(1)(10)}}{2}$

$x=\frac{3\pm\sqrt{-31}}{2}=\frac{3\pm i\sqrt{31}}{2}$

Roots are imaginary

So there are no x-intercepts.



12) $y=-3(x+1)(x-5)$

$\boxed{\text{y-int: } (0,15)}$

$y=-3(1)(-5)$

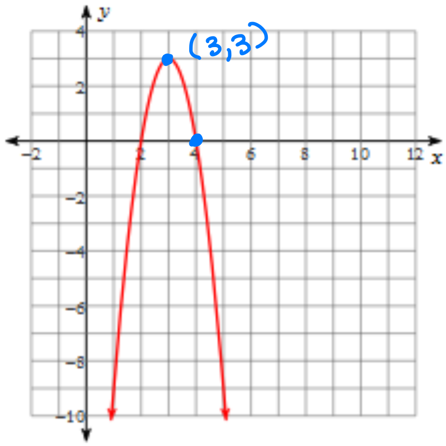
$\boxed{\text{x-int: } (-1,0)\ (5,0)}$

$0=x+1$ $\quad 0=x-5$

$-1=x$ $\quad 5=x$

Write the equation of the parabola in the three forms.

13)



Vertex Form:

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

Factored Form:

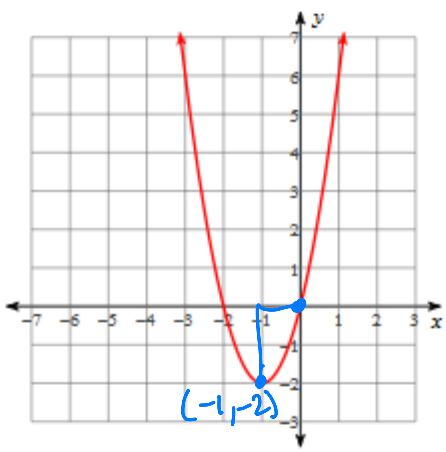
$y=-3(x-2)(x-4)$

Standard Form

$y=-3(x-6x+8)$

$\boxed{y=-3x+18x-24}$

14)



Vertex Form:

$y=2(x+1)^2-2$

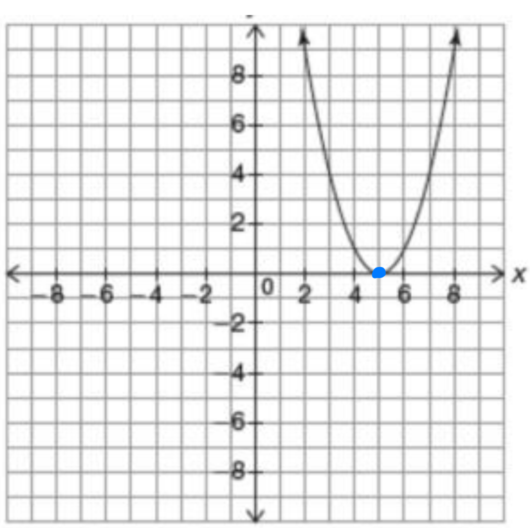
Factored Form:

$y=2x(x+2)$

Standard Form

$y=2x^2+4x$

15)



Vertex Form:

$y=(x-5)^2$

Factored Form:

$y=(x-5)(x-5)$

Standard Form

$y=x^2-10x+25$

Solve each inequality:

16) $5x - 7 > 8$ Linear Inequality

$5x > 15$

Ineq: $\boxed{x > 3}$

or

Interval: $\boxed{(3, \infty)}$

17) $(x+3)(x-1) \geq 0$

$\boxed{\text{Int. Not: } (-\infty, -3] \cup [1, \infty)}$

$\boxed{\text{Ineq. Not: } \{x \leq -3 \text{ o } x \geq 1\}}$

$+$ $-$ $+$

$(-)(-)$ -3 $(+)(-)$ 1 $(+)(+)$

18) $3x^2 - 8x + 4 < 0$

$(3x-2)(x-2) < 0$

$-2x$ $-6x$

$3x - 2 = 0$, $x = \frac{2}{3}$ $x - 2 = 0$, $x = 2$

$+$ $-$ $+$

$\frac{2}{3}$ $(+)(-)$ 2

Inequality: $\{\frac{2}{3} < x < 2\}$

Interval: $(\frac{2}{3}, 2)$

19) $x^2 + 5x \leq 30 - 2x$

$x^2 + 7x - 30 \leq 0$

$(x+10)(x-3) \leq 0$

$+$ $-$ $+$

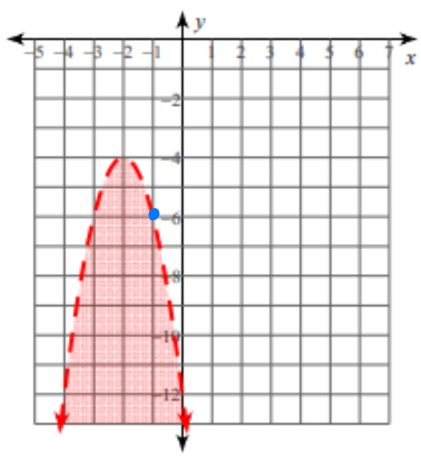
-10 3

$\boxed{\text{Inequality: } \{-10 \leq x \leq 3\}}$

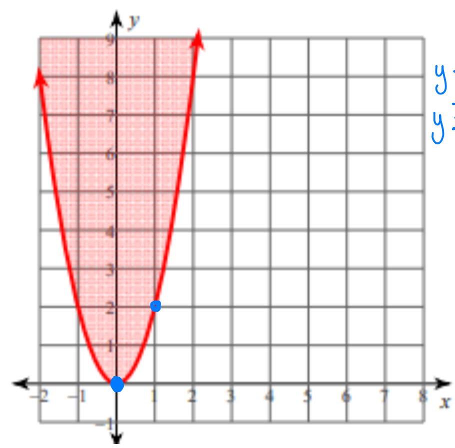
$\boxed{\text{Interval: } [-10, 3]}$

Write the inequality that represents each of the following graphs.

20) $y < -2(x+2)^2 - 4$



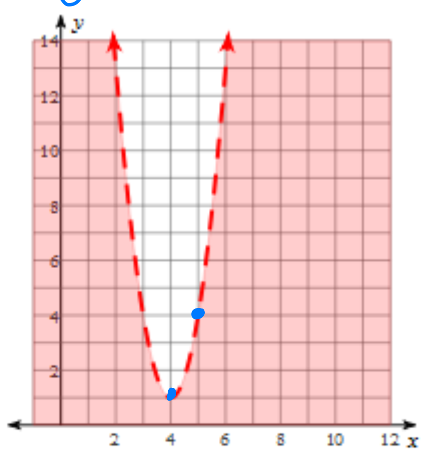
21) $y \geq 2x^2$



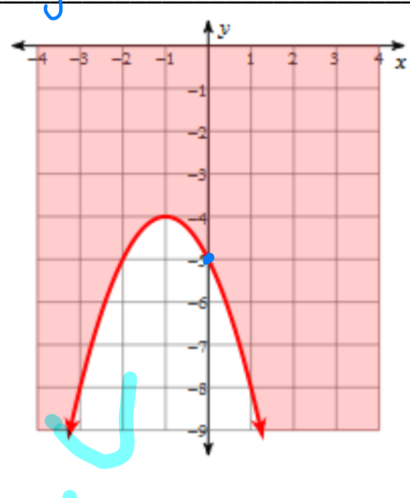
$y = a(x-0)^2 + 0$

$y \geq 2x^2$

22) $y < 3(x-4)^2 + 1$

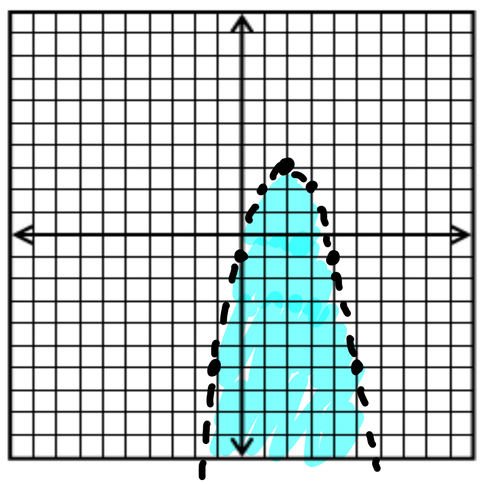


23) $y \geq -(x+1)^2 - 4$



Graph each function.

24) $y < -(x-2)^2 + 3$



$a = -1$

R.O.C

-1

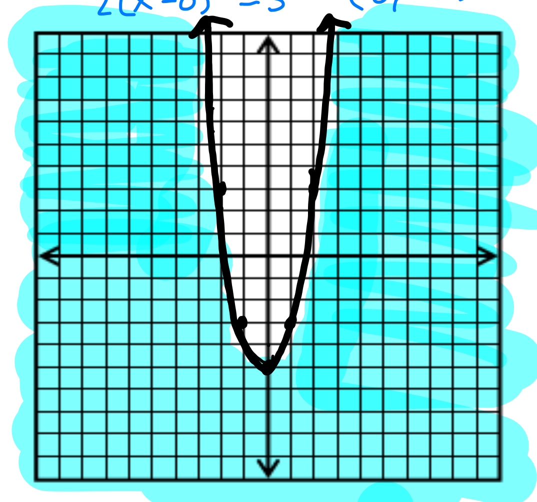
-3

-5

25) $y \le 2x^2 - 5$

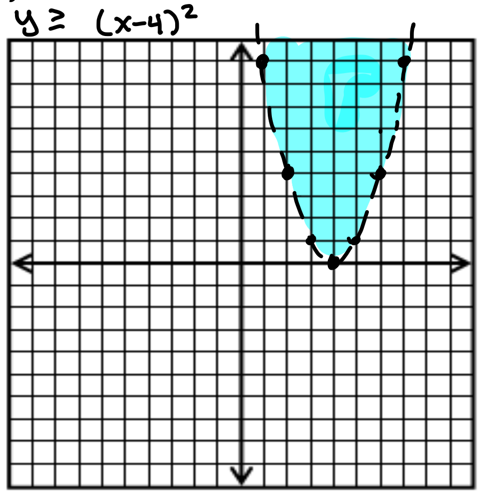
$2(x-0)^2 - 5$

Vertex $(0, -5)$



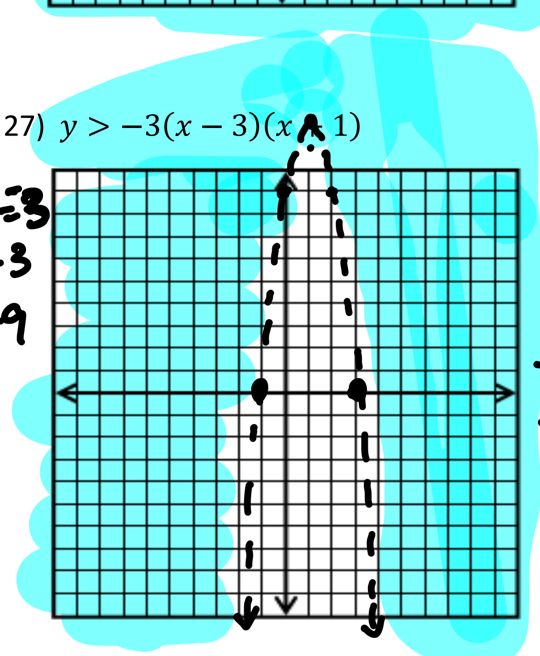
26) $y \ge x^2 - 8x + 16$

$y \ge (x-4)^2$



27) $y > -3(x-3)(x+1)$

a=1	a=-3
1	-3
3	-9
5	



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

$-3(1-3)(1+1)$

$-3(-2)(2)$

$(1, 12$

Put the following functions into vertex form. State the vertex and axis of symmetry.

28) $y = x^2 + 6x - 1$

$y = (x^2 + 6x + 9) - 1 - 9$

$\boxed{y = (x+3)^2 - 10}$

Vertex $(-3, -10)$

a.o.s. $x = -3$

29) $f(x) = 3x^2 - 12x + 2$

$f(x) = (3x^2 - 12x + 12) + 2 - 12$

$= 3(x^2 - 4x + 4) - 10$

$\boxed{f(x) = 3(x-2)^2 - 10}$

Vertex $(2, -10)$

a.o.s. $x = 2$

30) $g(x) = -2x^2 + 5x + 1$

$= (-2x^2 + 5x - \frac{25}{8}) + 1 + \frac{25}{8}$

$= -2(x^2 - \frac{5}{2}x + \frac{25}{16}) + \frac{33}{8}$

$\boxed{g(x) = -2(x - \frac{5}{4})^2 + \frac{33}{8}}$

vertex $(\frac{5}{4}, \frac{33}{8})$

a.o.s. $x = \frac{5}{4}$

Match each expression with an equivalent form:

B 31) $\sqrt{9x^4y^7} = 3x^2y^3\sqrt{y}$ A) $3x^2y^3$

B 32) $\sqrt{\frac{18x^7y^{10}}{2x^3y^3}} = \sqrt{9x^4y^7} = 3x^2y^3\sqrt{y}$ B) $3x^2y^3\sqrt{y}$

C 33) $3x^{\frac{1}{3}} \cdot x^{\frac{5}{3}} \cdot \left(y^{\frac{1}{3}}\right)^6 \cdot 3x^{\frac{6}{3}}y^{\frac{6}{3}} = 3x^2y^2 = 3(xy)^2$ C) $3(xy)^2$

D 34) $\sqrt[3]{27x^3y^6} = \boxed{3xy^2}$ D) $3xy^2$

A 35) $(27x^6y^9)^{\frac{1}{3}} = 3x^2y^3$ E) $3x^2y$

Write each expression in radical form. Simplify when necessary.

36) $m^{\frac{1}{2}} = \sqrt{m}$

37) $(6b)^{\frac{3}{2}} = \sqrt{6^3b^3} = 6|b|\sqrt{6b}$

38) $12x^{\frac{2}{3}} = 12\sqrt[3]{x^2}$

Write each expression using rational exponents.

39) $4\sqrt[3]{xy^2} = 4x^{\frac{1}{3}}y^{\frac{2}{3}}$

40) $x\sqrt[5]{x^4} = x^1 \cdot x^{\frac{4}{5}} = \boxed{x^{\frac{9}{5}}}$

41) $\sqrt{5x} = \boxed{(5x)^{\frac{1}{2}}}$ or $5^{\frac{1}{2}}x^{\frac{1}{2}}$

Simplify. Use absolute value signs when necessary.

$\sqrt[3]{-1 \cdot -1 \cdot -1}$ $\sqrt[3]{-1}$

42) $3\sqrt{8} = 3 \cdot 2\sqrt{2}$ $\boxed{6\sqrt{2}}$

2 2 2

43) $-5\sqrt{98n^3} = -5 \cdot 7n\sqrt{2n} = \boxed{-35|n|\sqrt{2n}}$

2 49

7 7

44) $\sqrt[3]{-16x^6y^5}$

$-2x^2y\sqrt[3]{2y^2}$

$\sqrt[3]{16}$

$\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot 2$

45) $\sqrt[4]{48a^8b^9} = \boxed{2a^2b^2\sqrt[4]{3b}}$

6 8

2 3 2 4

2 2

46) $\sqrt{81x^2y^8} = \boxed{9|x|y^4}$

47) $-2xy^3\sqrt{18x^4y^7z}$

$-2xy^3 \cdot 3x^2y^3\sqrt{2yz}$

$\boxed{-6|x^3|y^6\sqrt{2yz}}$

48) $3\sqrt{24} - \sqrt{54} - 2\sqrt{45}$

2 12 9 6 9 5

2 6 3 3 2 3 3 3

3 2

$3 \cdot 2\sqrt{6} - 3\sqrt{6} - 2 \cdot 3\sqrt{5}$

$6\sqrt{6} - 3\sqrt{6} - 6\sqrt{5}$

$\boxed{3\sqrt{6} - 6\sqrt{5}}$

49) $(3\sqrt{5})^2 = 9 \cdot 5 = 45$

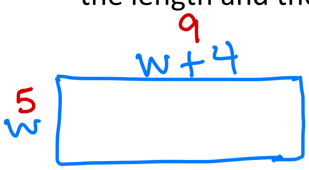
50) $(5\sqrt{6x^3})(-2\sqrt{3x^5})$

$-10\sqrt{18x^8}$

$-10 \cdot 3x^4\sqrt{2}$

$\boxed{-30x^4\sqrt{2}}$

51) The length of a rectangle is 4 m more than the width. The area of the rectangle is 45 m^2. Find the length and the width.



$l = w + 4$
$= 5 + 4$

dimensions

$l \times w$

$\boxed{9m \times 5m}$

$A = lw$

$45 = (w+4)w$

$45 = w^2 + 4w$

$0 = w^2 + 4w - 45$

$0 = (w+9)(w-5)$

$w+9=0 \quad w-5=0$

$\cancel{w=-9} \quad w=5$

52) The length of a photograph is 1 cm less than twice the width. The area is 28 cm^2. Find the dimensions of the photograph.

$l = 2w - 1$
$2(4) - 1$

$w = 4cm$

$l = 7cm$

$\boxed{7cm \times 4cm}$

$A = lw$

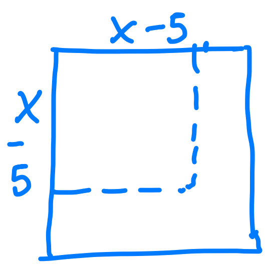
$28 = (2w-1)(w)$

$0 = 2w^2 - w - 28$

$0 = (2w+7)(w-4)$

$w = -\frac{7}{2} \quad w = 4$

53) If the sides of a square are decreased by 5 cm, its area becomes 81 cm^2. Determine the area of the original square.



$A = (side)^2$

$\sqrt{81} = \sqrt{(x-5)^2}$

$\pm 9 = x - 5$

$14 = x$

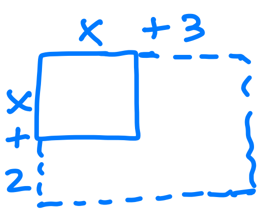
$-9 = x - 5$

$\cancel{-4 = x}$

$A = 14^2$

$= \boxed{196\ cm^2}$

54) A square field has 3 m added to its length and 2 m added to its width. The field then had an area of 90 m^2. Find the length of a side of the original field.



$(x+3)(x+2) = 90$

$x^2 + 5x + 6 = 90$

$x^2 + 5x - 84 = 0$

$(x+12)(x-7) = 0$

$x = -12 \quad x = 7$

$\boxed{7m}$

55) Suppose you are building a storage box of volume 4368 in^3. The length of the box will be 24 in. The height of the box will be 1 in. more than its width. Find the height and width of the box.

$V = 4368\ in^3$

$V = l \cdot w \cdot h$

$\frac{4368}{24} = \frac{(\cancel{24}) \cdot w \cdot (w+1)}{\cancel{24}}$

$182 = w^2 + w$

$0 = w^2 + w - 182$

$0 = (w+14)(w-13)$

$w+14=0 \quad w-13=0$

$\cancel{w=-14} \quad w=13$

The width is 13in.

The height is 14in.

51) The length of a rectangle is 4 m more than the width. The area of the rectangle is 45 m^2. Find the length and the width.

52) The length of a photograph is 1 cm less than twice the width. The area is 28 cm^2. Find the dimensions of the photograph.

53) If the sides of a square are decreased by 5 cm, its area becomes 81 cm^2. Determine the area of the original square.

54) A square field has 3 m added to its length and 2 m added to its width. The field then had an area of 90 m^2. Find the length of a side of the original field.

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