MAT 055 | **Name** Answers
Practice Test Chp 18 | **Date**
Version B | **Campus**

All answers are to be in simplest form. A scientific calculator may be used. No notes, no books, no homework may be used. This is a practice test consisting of basic concepts presented. It reflects what could be on the actual test. <u>Students are encouraged to review all of the material presented</u>.

$x = \frac{-b}{2a}$ Find y by substituting the x value back in. Note that f(x) is replaced by y.

Find the vertex of the parabola.

1) $f(x) = \frac{1}{3}x^2 - \frac{4}{3}x - \frac{20}{3}$

$$\frac{-\left(\frac{-4}{3}\right)}{2\left(\frac{1}{3}\right)} = \frac{\frac{4}{3}}{\frac{2}{3}} \qquad \frac{4}{3} \div \frac{2}{3} = \frac{\cancel{4}}{\cancel{3}} \cdot \frac{\cancel{3}}{\cancel{2}} = \frac{2}{1}$$

Vertex:(2 , -8)

Answer: (2, −8)

$$y = \frac{1}{3}\left(\frac{2}{1}\right)^2 - \frac{4}{3}\left(\frac{2}{1}\right) - \frac{20}{3}$$
$$y = \frac{1}{3}\left(\frac{4}{1}\right) - \frac{8}{3} - \frac{20}{3}$$
$$y = \frac{4}{3} - \frac{8}{3} - \frac{20}{3} = \frac{-24}{3} = -8$$

2) $f(x) = 3x^2 + 7$

$$f(x) = 3x^2 + 0x + 7$$

Vertex:(0 , 7)

Answer: (0, 7)

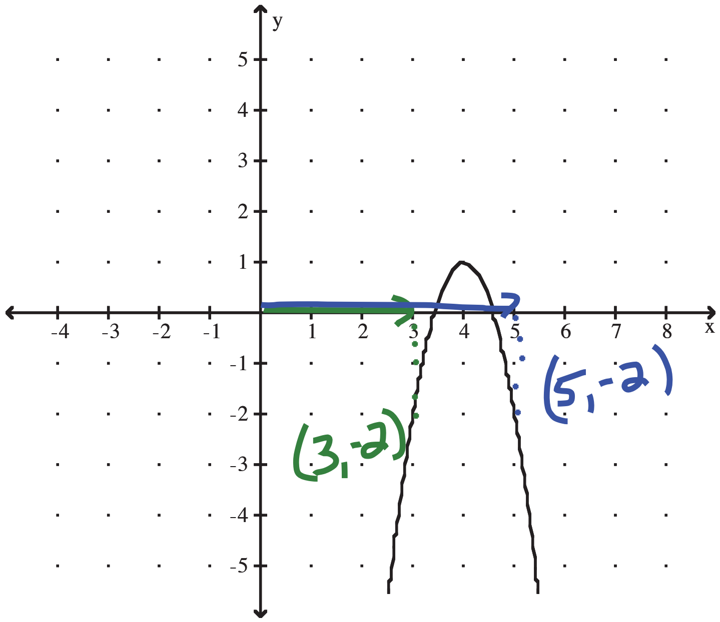
$$x = \frac{-0}{2(3)} = \frac{0}{6} = 0$$

Substitute a zero term for missing b or c terms. The a term cannot be missing or it is no longer a quadratic.

$$y = 3(0)^2 + 0(0) + 7$$
$$y = 7$$

Use the graph of f to evaluate each expression.

3) f(3), f(5) Given the x value, what is the y value?



f(3) = -2 f(5) = -2

Answer: –2, –2

For the given f(x), find the following and graph the function.

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

4) $f(x) = -5x^2$ $x = \frac{-0}{2(-5)} = 0$ $y = -5(0)^2$

a) Identify the vertex (0,0)

b) What is the axis of symmetry? $x = 0$ Express as an equation. Use the x value from the vertex.

c) Does the graph open up or down? ∩ down

Opens down when the a term is negative.

d) Will the vertex results in a minimum or maximum value? maximum Vertex is the high point.

e) Indentify the minimum or maximum y-value. 0 y value of the vertex

f) Evaluate f(–2) -20 $f(-2) = -5(-2)^2 \Rightarrow f(-2) = -5(4)$ $f(-2) = -20$

g) Evaluate f(3) -45 $f(3) = -5(3)^2 \Rightarrow f(3) = -5(9)$ $f(3) = -45$

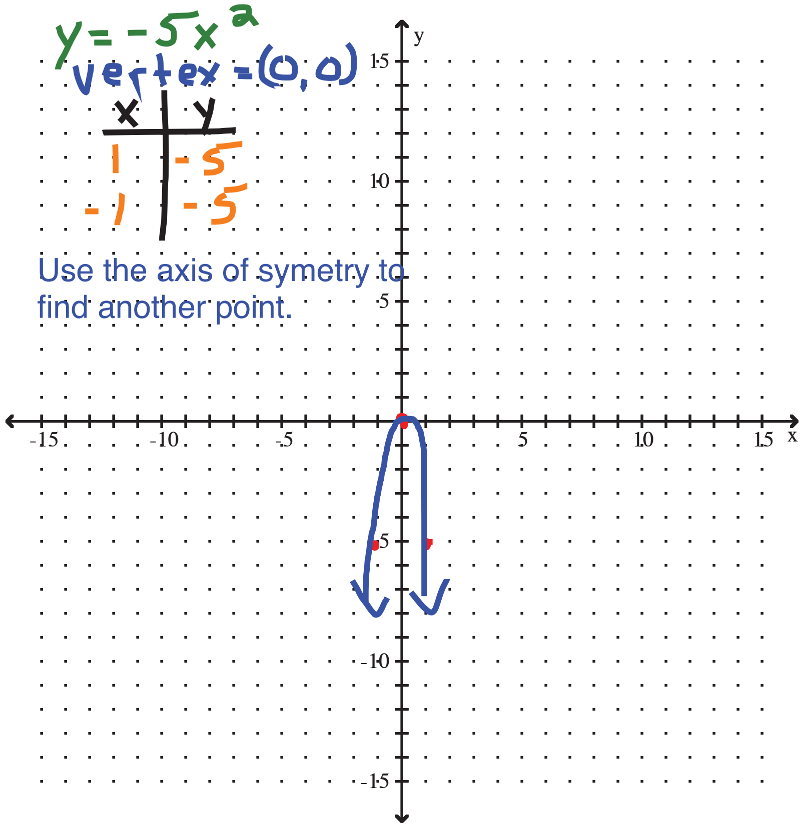
h) Graph the function.

$y = -5x^2$

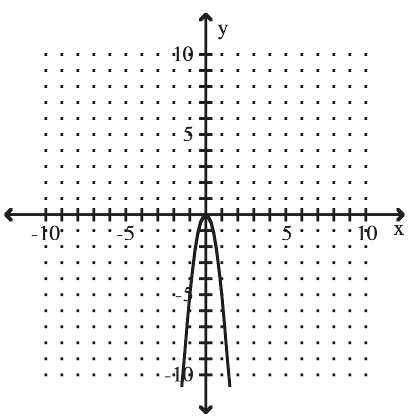
vertex $= (0, 0)$

x	y
1	-5
-1	-5

Use the axis of symetry to find another point.



Answer:



For the given equation, find the following then graph and solve the equation.

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

5) $f(x) = 8x - x^2$

$x = \frac{-8}{2(-1)} \Rightarrow x = \frac{-8}{-2} \Rightarrow x = 4$

$y = -(4)^2 + 8(4)$

$y = -16 + 32$

$y = 16$

a) Identify the vertex $(4, 16)$

b) What is the axis of symmetry? $x = 4$

a term is negative so opens down

c) Does the graph open up or down? $\cap$ down

f) Graph the equation.

g) What is(are) the solution(s) to the equation? $x = 0, 8$

If the solution is not real, say so.

$0 = 8x - x^2$

$0 = -x^2 + 8x$

$0 = -x(x - 8)$

$x = 0 \quad x = 8$

Factor, use the quadratic equation or complete the square to solve.

$-x = 0$

$\overline{-1} \quad \overline{-1}$

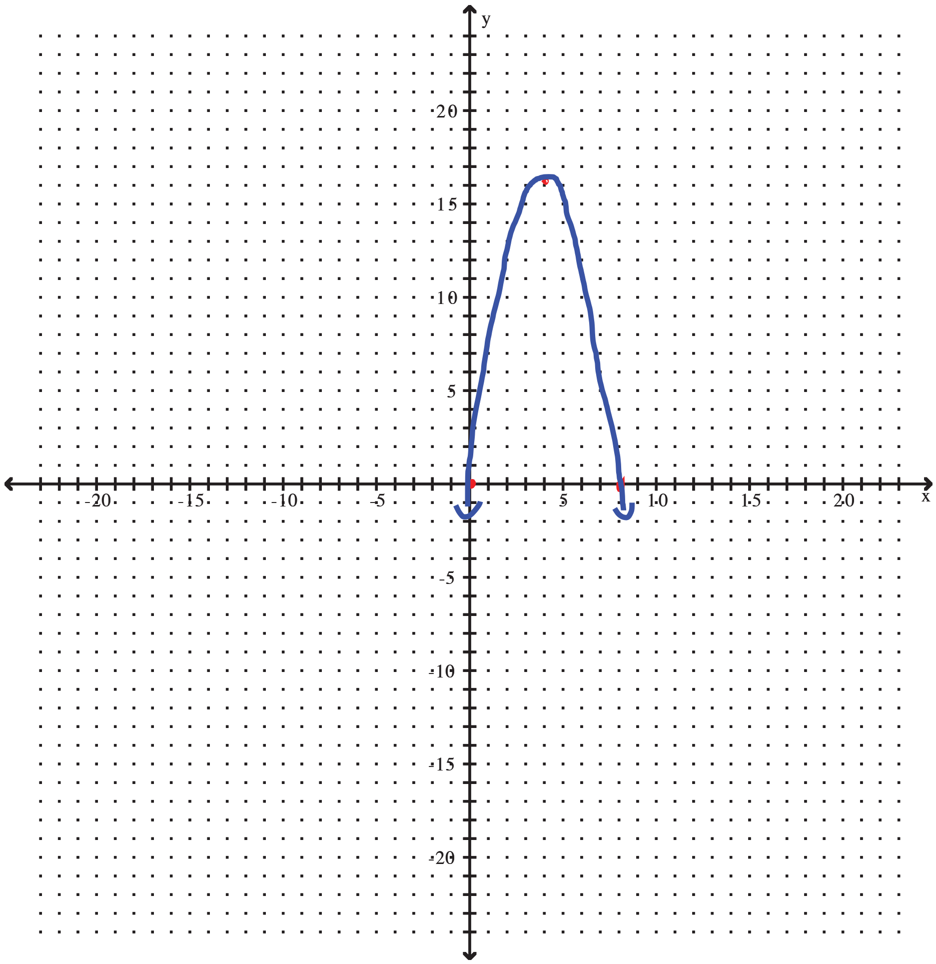
$x = 0$

$x - 8 = 0$

$+8 \quad +8$

$x = 8$

Set each factor the contains a variable to zero and solve.



Answer: (4, 16)

Solve quadratic equation by factoring.

6) $x^2 + 2x - 80 = 0$

$(x+10)(x-8) = 0$

$x = -10 \quad x = 8$

$x + 10 = 0$
$ - 10 \quad -10$
$x = -10$

$x - 8 = 0$
$+8 \quad +8$
$x = 8$

Answer: $-10, 8$

Use the square root property to solve the equation.

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

Because you are taking the square root on each side, make sure to use plus/minus.

$x + 7 = \pm\sqrt{3}$
$-7 \quad -7$
$x = -7 \pm \sqrt{3}$

Answer: $-7 \pm \sqrt{3}$

8) $\sqrt{(7x + 8)^2} = \pm\sqrt{2}$

Answer: $\dfrac{-8 \pm \sqrt{2}}{7}$

$7x + 8 = \pm\sqrt{2}$
$-8 \quad -8$
$\dfrac{7x}{7} = \dfrac{-8 \pm \sqrt{2}}{7}$
$x = \dfrac{-8 \pm \sqrt{2}}{7}$

Find the term that should be added to the expression to form a perfect square trinomial. Write the resulting perfect square trinomial in factored form.

9) $x^2 + 5x$

$\left(\frac{b}{2}\right)^2$ Add to both sides

Answer: $\frac{25}{4}$; $\left(x + \frac{5}{2}\right)^2$

$\left(\frac{5}{2}\right)^2 = \frac{25}{4}$

$x^2 + 5x + \frac{25}{4}$

$\left(x + \frac{5}{2}\right)^2$

Term to add $\frac{25}{4}$

Factored Form $\left(x + \frac{5}{2}\right)^2$

Solve the equation by completing the square.

10) $x^2 + 2x - 35 = 0$

$+35 \quad +35$

Answer: 5, -7

While this could be factored other ways, the question asks for completing the square.

$x^2 + 2x + \left(\frac{b}{2}\right)^2 = 35 + \left(\frac{b}{2}\right)^2$

$x^2 + 2x + \left(\frac{2}{2}\right)^2 = 35 + \left(\frac{2}{2}\right)^2$

$x^2 + 2x + 1 = 36$

$\sqrt{(x+1)^2} = \pm\sqrt{36}$

$x + 1 = \pm 6$

$-1 \quad -1$

$x = -1 \pm 6$

$x = -1 + 6 \qquad x = -1 - 6$

$x = 5 \qquad x = -7$

11) $5x^2 + 10x = -2$

$\frac{}{5} \quad \frac{}{5} \quad \frac{}{5}$

Answer: $\frac{-5 \pm \sqrt{15}}{5}$

Divide by the a coefficient to create a leading coefficient of 1.

$x^2 + 2x + \left(\frac{b}{2}\right)^2 = -\frac{2}{5} + \left(\frac{b}{2}\right)^2$

$x^2 + 2x + \left(\frac{2}{2}\right)^2 = -\frac{2}{5} + \left(\frac{2}{2}\right)^2$

$x^2 + 2x + 1 = -\frac{2}{5} + 1\left(\frac{5}{5}\right)$

$\sqrt{(x+1)^2} = \pm\sqrt{\frac{3}{5}}$

$x + 1 = \pm\frac{\sqrt{3}\cdot\sqrt{5}}{\sqrt{5}\cdot\sqrt{5}}$ Rationalize the denominator

$x + 1 = \frac{\pm\sqrt{15}}{5}$

$-1 \quad -1$

$x = -1 \pm \frac{\sqrt{15}}{5}$

or

$x = \frac{-5 \pm \sqrt{15}}{5}$

Factor out the GCF to make it easier.

12) $2x^2 - 4x - 6 = 0$

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

GCF does not play a role in a solution.

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

$+3 \quad +3$

$\left(\frac{b}{2}\right)^2 \quad \left(\frac{b}{2}\right)^2$

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

$x^2-2x+1 = 3+1$

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

$x-1 = \pm 2$

$+1 \quad +1$

$x = 1 \pm 2$

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

$x=-1$ $\quad$ $x = 3$

While this could be factored other ways, the question asks for completing the square.

Answer: 3, –1

13) $x^2 + x + 1 = 0$

$-1 \quad -1$

$\left(\frac{b}{2}\right)^2 \quad \left(\frac{b}{2}\right)^2$

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

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

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

$x+\frac{1}{2} = \pm\frac{\sqrt{-3}}{\sqrt{4}}$

$x+\frac{1}{2} = \pm\frac{i\sqrt{3}}{2}$

$-\frac{1}{2} \quad -\frac{1}{2}$

$x = -\frac{1}{2} \pm \frac{i\sqrt{3}}{2}$

Answer: $\frac{-1 \pm i\sqrt{3}}{2} = \frac{-1}{2} \pm \frac{i\sqrt{3}}{2}$ $\quad$ $a+bi$ form

Solve the formula for the specified variable.

14) $M = \pi r^2 hd$ for r

$\frac{M}{\pi hd} = \frac{\pi r^2 hd}{\pi hd}$

$\pm\sqrt{\frac{M}{\pi hd}} = \sqrt{r^2}$

$\pm\sqrt{\frac{M}{\pi hd}} = r$

Answer: $r = \pm\sqrt{\frac{M}{\pi hd}}$

Use the discriminant to determine the number of real solutions.

LOOK @ b^2-4ac

15) $x^2 - 4x - 2 = 0$ $\qquad$ Number of Real Solutions 2

Answer: Two real solutions

$a=1 \quad b=-4 \quad c=-2$

$(-4)^2-4(1)(-2)$

$16+8$

24

$b^2-4ac > 0$ 2 real

$b^2-4ac = 0$ 1 real

$b^2-4ac < 0$ 2 Not real

16) $x^2 - 4x + 6 = 0$ $a=1$ $b=-4$ $c=6$ Number of Real Solutions $\underline{\ 0\ }$

Answer: No real solutions

$(-4)^2 - 4(1)(6)$

$16 - 24 = -8$

Solve the equation using the quadratic formula. Write complex solutions in standard form.

$a=1$ $b=1$ $c=4$

$$\frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

17) $x^2 + x + 4 = 0$

$$\frac{-1 \pm \sqrt{(1)^2-4(1)(4)}}{2(1)} = \frac{-1 \pm \sqrt{1-16}}{2} = \frac{-1 \pm \sqrt{-15}}{2} = \frac{-1 \pm i\sqrt{15}}{2}$$

$$\frac{-1}{2} \pm \frac{i\sqrt{15}}{2}$$

Correct form for a+bi

Answer: $-\frac{1}{2} \pm i\frac{\sqrt{15}}{2}$

$a=7$ $b=5$ $c=4$

18) $7x^2 + 5x + 4 = 0$

$$\frac{-5 \pm \sqrt{(5)^2-4(7)(4)}}{2(14)} = \frac{-5 \pm \sqrt{25-112}}{28}$$

$$\frac{-5 \pm \sqrt{-87}}{28} = \frac{-5 \pm i\sqrt{87}}{14} = \frac{-5}{14} \pm \frac{i\sqrt{87}}{14}$$

Answer: $-\frac{5}{14} \pm i\frac{\sqrt{87}}{14}$

Use the given substitution to solve the equation.

19) $x^4 - 11x^2 + 10 = 0,\ \underline{u = x^2}$ $(x^2)^2 = x^4$

$u^2 - 11u + 10 = 0$

$(u-10)(u-1) = 0$

$u = 10 \quad u = 1$

$\sqrt{x^2} = \pm\sqrt{10} \quad \sqrt{x^2} = \pm\sqrt{1}$ $\quad \pm\sqrt{1} = \pm 1$

$x = \pm\sqrt{10} \quad x = \pm 1$

Answer: $\pm 1,\ \pm\sqrt{10}$

Solve the equation.

$u = \sqrt{x}$

The b term provides a hint on how to set up the substitution.

20) $x - 11\sqrt{x} + 30 = 0$

Answer: 25, 36

$u^2 - 11u + 30 = 0$

$(u-5)(u-6) = 0$

$u = 5 \quad u = 6$

$(\sqrt{x})^2 = (5)^2 \quad (\sqrt{x})^2 = (6)^2$

$x = 25 \quad x = 36$