Your name: Answers Friday May 13, 2022

MPM2D Unit 5 Test A	TOTAL / 35

Communication / 3 • One = sign per line, where appropriate • Coordinates given as (x , y) • x-intercepts written as $x =$ ___ • Units on answers to word problems	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-b}{2a}$

1. State the x-intercepts of $y = \frac{-1}{8}(7x + 1)(x + 13)$ [1 K]

$x = \frac{-1}{7}$ and $x = -13$

2. Find the x-intercepts of $y = 5x^2 - 11x + 2$ [3 A]

$0 = 5x^2 - 10x - x + 2$

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

$= (x-2)(5x-1)$

$x = 2$ $\qquad$ $x = \frac{1}{5}$

3. Find the x-intercepts of $y = -4(x + 3)^2 + 324$ **using opposite operations.** [4 A]

$0 = -4(x+3)^2 + 324$

$\frac{-324}{-4} = \frac{-4(x+3)^2}{-4}$

$81 = (x+3)^2$

$\pm\sqrt{81} = x+3$

$9 = x+3$ or $-9 = x+3$

$6 = x$ $\qquad$ $-12 = x$

4. Find the coordinates of the vertex of $y = 3x^2 - 18x + 11$ **by completing the square.** [3 T]

$= 3(x^2-6x+9)-9(3)+11$

$= 3(x-3)^2-16$

$V(3,-16)$

5. Solve this equation **by factoring**. [5 A]

$2x(15x + 2) = 2$

$30x^2+4x = 2$

$30x^2+4x-2 = 0$

$2(15x^2+2x-1) = 0$

$2(15x^2+5x-3x-1) = 0$

$2(5x(3x+1)-(3x+1)) = 0$

$2(3x+1)(5x-1) = 0$

$x = -\frac{1}{3} \quad x = \frac{1}{5}$

6. Solve this equation **with the quadratic formula**.
Give your answer(s) to 2 decimal places, if necessary. [4 K]

$10 = 2x^2 - 17x + 25$

$0 = 2x^2 - 17x + 15$

$a=2 \quad b=-17 \quad c=15$

$$x = \frac{-(-17) \pm \sqrt{(-17)^2 - 4(2)(15)}}{2(2)}$$

$$= \frac{17 \pm \sqrt{169}}{4}$$

$$x = \frac{17+13}{4} \quad \text{or} \quad x = \frac{17-13}{4}$$

$$= \frac{30}{4} \qquad = \frac{4}{4}$$

$$= \frac{15}{2} = 7.5 \qquad = 1$$

7. Solve this equation **with opposite operations**. [4 A]

$7(x+1)^2 - 100 = 747$

$7(x+1)^2 = 847$

$(x+1)^2 = \frac{847}{7}$

$x+1 = \pm\sqrt{121}$

$x+1 = 11 \quad \text{or} \quad x+1 = -11$

$x = 10 \qquad x = -12$

8. A trebuchet launches a boulder from a kingdom's castle onto an opposing army below.

The boulder's height is modeled by $\mathbf{y = -16x^2 + 32x + 560}$, where the boulder is *y* feet above the ground after *x* seconds.

a) What is the boulder's maximum height above the ground? [3 T]

$x = \frac{-b}{2a}$

$= \frac{-32}{2(-16)}$

$= 1$

$y = -16(1)^2 + 32(1) + 560$

$= -16 + 32 + 560$

$= 576$

∴ Boulder's maximum height is 576 feet

b) How long after launch does the boulder hit the ground? [3 T]
This equation is factorable, but you *can* use the quadratic formula if you prefer.

$y = -16(x^2 - 2x - 35)$

$= -16(x-7)(x+5)$

$x = 7$ $\quad$ ~~$x = -5$~~

Boulder hits ground after 7 s.

c) What is the initial height of the boulder? [2 T]

↳ $x = 0$

$y = -16(0)^2 + 32(0) + 560$

$= 560$ ~~ft~~