Name:_____ Block:___

Test: Unit8 (1/2)
Quadratic formula.

Practice

There are 7 questions in this quiz, each of equal value.
Standard time for the quiz is 30 minutes (or to the end of the block).
Four operations calculator is allowed.

1. Solve by factoring (zero product property)

$3x^2 - 11x + 6 = 0$

M	A	T
18	-11	-9, -2

$3x^2 - 9x - 2x + 6 = 0$

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

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

$x = \frac{2}{3}$ or $x = 3$

check: $3 \cdot 3^2 - 11 \cdot 3 + 6 \stackrel{?}{=} 0$, $27 - 33 + 6 \stackrel{?}{=} 0$ ✓ and $\frac{2}{3}$

1'. Solve by factoring (zero product property)

$x^2 - 5x = -4$

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

M	A	T
4	-5	-4, -1

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

$x(x-4) - 1(x-4) = 0$

$(x-1)(x-4) = 0$

$x = 1$ or $x = 4$

check: $1^2 - 5 \cdot 1 \stackrel{?}{=} -4$ ✓

$4^2 - 20 \stackrel{?}{=} -4$ ✓

2. Solve by using the quadratic formula

$x^2 + 3.75 = 4x$

$x^2 - 4x + 3.75 = 0$

$x_{1,2} = \frac{4 \pm \sqrt{16 - 4 \cdot 3.75}}{2} =$

$= \frac{4 \pm \sqrt{1}}{2} = \frac{4 \pm 1}{2} = \begin{cases} \to 2.5 \\ \to 1.5 \end{cases}$

check:

$(2.5)^2 - 4 \cdot 2.5 + 3.75 \stackrel{?}{=} 0$

$6.25 - 10 + 3.75 \stackrel{?}{=} 0$ ✓

$(1.5)^2 - 4(1.5) + 3.75 \stackrel{?}{=} 0$

$2.25 - 6 + 3.75 \stackrel{?}{=} 0$ ✓

2'. Solve by using the quadratic formula

$2x^2 - 4.5 = 0$

$2x^2 + 0 \cdot x - 4.5 = 0$

$x_{1,2} = \frac{0 \pm \sqrt{0 + 4 \cdot 2 \cdot 4.5}}{2 \cdot 2} =$

$= \frac{\pm\sqrt{36}}{4} = \frac{\pm 6}{4} = \begin{cases} \to \frac{3}{2} \\ \to -\frac{3}{2} \end{cases}$

check $2 \cdot \left(\pm\frac{3}{2}\right)^2 - 4.5 \stackrel{?}{=} 0$

$2 \cdot \frac{9}{4} - 4.5 \stackrel{?}{=} 0$

✓

3. Write a quadratic equation for which the solutions satisfy:

(a) Sum of solutions is -3

(b) Product of solution is $\frac{1}{4}$

$b = -(-3) = +3$

$c = \frac{1}{4}$

$x^2 + 3x + \frac{1}{4} = 0$

Also

$4x^2 + 12x + 1 = 0$

3'. Write a quadratic equation for which there is only one solution, equal to 3.

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

$x^2 - 6x + 9 = 0$

3''. Write a quadratic equation with two solutions, 3 and 7.

$(x-3)(x-7) = 0$

$x^2 - 10x + 21 = 0$

4. Determine the type and number of solutions:

$$2x^2 - 3x + 4 = 0$$

$\Delta = (-3)^2 - 4 \cdot 2 \cdot 4 =$

$= 9 - 32 = -21$

Two Complex Conjugate.

4'. Determine the type and number of solutions:

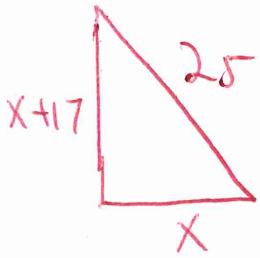
$$3x^2 - 18x + 27 = 0$$

$\Delta = (-18)^2 - 4 \cdot 3 \cdot 27$

$= 324 - 12 \cdot 27 = 0$

One Real Solution

5. The hypotenuse of a right triangle is 25km long. The length of one leg is 17km less than the other. Find the lengths of the legs.



$x^2 + (x+17)^2 = 25^2$

$x^2 + x^2 + 34x + 17^2 = 25^2$

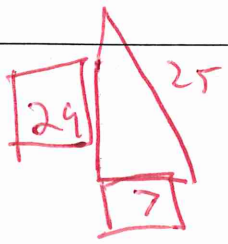
$2x^2 + 34x + 289 = 625$

$2x^2 + 34x - 336 = 0$

$x^2 + 17x - 168 = 0$

$x_{1,2} = \frac{-17 \pm \sqrt{289 + 4 \cdot 168}}{2}$

$= \frac{-17 \pm \sqrt{961}}{2} = \frac{-17 \pm 31}{2} = \begin{cases} 7 \\ -24 \end{cases}$



5'. Given 3 consecutive integers, the product of the first-two is 7 more than the third integer. Find the 3 integers.

$n, n+1, n+2$

$n \cdot (n+1) = 7 + (n+2)$

$n^2 + n = 9 + n$

$n^2 = 9$

$n = \boxed{3}$ or $\boxed{-3}$

check:

3, 4, 5

$3 \cdot 4 \stackrel{?}{=} 7 + 5$

$12 = 12$ ✓

$-3, -2, -1$

$(-3) \cdot (-2) \stackrel{?}{=} 7 + (-1)$

$6 \stackrel{?}{=} 6$ ✓

6. Write the equation of the line with slope $m = -2$ that goes through the point $(x, y) = (3,5)$

$(y-5) = -2(x-3)$

$\boxed{y = -2x + 11}$

check:

slope $= -2$

$5 \stackrel{?}{=} -2 \cdot 3 + 11$ ✓

6'. Solve:

$\left.\begin{aligned} 2x &= y - 5 \\ 8 &= 4y - 2x \end{aligned}\right\} \rightarrow$ $y = 2x + 5$

$8 = 4(2x+5) - 2x$

$8 = 8x + 20 - 2x$

$-12 = 6x$

$\boxed{x = -2}$

$\boxed{y = 1}$

check: $2 \cdot (-2) \stackrel{?}{=} 1 - 5$ ✓

$8 \stackrel{?}{=} 4 \cdot 1 - 2 \cdot (-2)$ ✓

7.

a. Given the line $y = \frac{1}{3}x + \frac{10}{3}$, find the perpendicular line that goes through the origin (0,0).

$m_{\perp} = -3 \Rightarrow y = -3x$

b. Find the intersection point of these two lines.

$\left.\begin{aligned} y &= \tfrac{1}{3}x + \tfrac{10}{3} \\ y &= -3x \end{aligned}\right\}$ $-3x = \frac{1}{3}x + \frac{10}{3}$

$-9x = x + 10$

$-10x = 10 \rightarrow \boxed{x = -1}$ $\boxed{y = 3}$

check:

point on BOTH Lines

8. Given the parabola

$$y = \frac{1}{2}x^2 + 1$$

and the line:

$$y = x + 1$$

Find the point(s) of intersection between the parabola and the line.

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

$\frac{1}{2}x^2 = x \Rightarrow$ $\frac{1}{2}x^2 - x = 0$

$x\left(\frac{1}{2}x - 1\right) = 0$

$\boxed{x = 0}$ or $\boxed{x = 2}$ Two intersections.

8'. Given the parabola

$$y = \frac{1}{2}x^2 + 1$$

and the line:

$$y = x + 0.5$$

↑ check by plot on Desmos

Find the point(s) of intersection between the parabola and the line.

$\frac{1}{2}x^2 + 1 = x + 0.5 \quad / \times 2$

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

$x^2 - 2x + 1 = 0 \Rightarrow (x-1)^2 = 0$ $\boxed{x = 1}$

one point of intersection

=== End ====