

# Algebra 8R SIWS Unit Test

Name: ANSWER KEY Period: \_\_\_\_\_ Date: \_\_\_\_\_

Show all work! Label units where needed. Each question is worth 5 points unless otherwise noted. Read carefully and think critically!

A video game company has the following total expenses  $E$  and incomes  $I$  for producing  $x$  number of video games.

$$E = 300 + 14x$$

$$I = 225 + x^2$$

1.) Write an equation for the profit  $P$  for producing  $x$  video games. Simplify your equation.

$$P = 225 + x^2 - 300 - 14x$$

+ 3 no ( ) or +14x

$$P = x^2 - 14x - 75$$

2.) How much profit will the company make if they produce 75 video games?

$$P = (75)^2 - 14(75) - 75$$

$$P = \$4,500$$

6600

3.) The company wants to make at least \$37,000. How many video games must they produce?

$$37,000 = x^2 - 14x - 75$$

+ 3 guess

$$0 = x^2 - 14x - 37075$$

186

$$x = \frac{14 \pm \sqrt{(-14)^2 - 4(1)(-37075)}}{2}$$

$$x = \frac{14 \pm \sqrt{148496}}{2} \rightarrow 199.68 \rightarrow 200 \text{ games}$$

15

For 4-9, identify whether the equations are linear, exponential, quadratic, or none of these and explain how you know.

4.)  $y = 3(x - 5) + 9(4 - x)$

Linear, expanded  
is  $-6x + 21$ ,  $mx + b$

5.)  $y = 4(x^2 + 7)$

Quadratic,  $4x^2 + 28$   
 $x^2$  is highest power in expanded  
form  
 $+3x^2$  only

6.)  $y = \frac{8 - 2x}{5}$

Linear,  $\frac{8}{5} - \frac{2x}{5}$   
 $mx + b$

7.)  $y = 8x(3x^2 + 10)$

None. Not two linear  
factors.  $24x^3$ .

For 8 and 9, simplify the radical expression.

8.)  $12\sqrt{5} \cdot 4\sqrt{18}$

$$\begin{array}{ll} \swarrow & \searrow \\ 48\sqrt{90} & 12\sqrt{5} \cdot 4\sqrt{9 \cdot 2} \\ 48\sqrt{9 \cdot 10} & 12\sqrt{5} \cdot 4 \cdot 3\sqrt{2} \\ 48 \cdot 3\sqrt{10} & 12\sqrt{5} \cdot 12\sqrt{2} \\ 144\sqrt{10} & 144\sqrt{10} \end{array}$$

9.)  $\frac{4\sqrt{10}}{\sqrt{6}}$

$$\begin{array}{l} \swarrow \quad \searrow \\ \frac{4\sqrt{10}}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} \\ \frac{4\sqrt{60}}{6} = \frac{2\sqrt{60}}{3} \\ \frac{2\sqrt{4 \cdot 15}}{3} = \frac{4\sqrt{15}}{3} \end{array}$$

$\rightarrow 4\sqrt{\frac{10}{6}} = 4\sqrt{\frac{5}{3}} = \frac{4\sqrt{5}}{\sqrt{3}}$   
 $\frac{4\sqrt{5}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{4\sqrt{15}}{3}$   
 $+3 \neq$

For 10 and 11, using the two equations, write a new equation relating the given variables. Think about what variable you **don't** want and how you can use the second equation to help you eliminate that variable.

10.)  $y$  in terms of  $z$ .

$$y = 3x^2 + 8z$$

$$x = 4z - 5$$

$$y = 3(4z - 5)^2 + 8z$$

$$y = 3(16z^2 - 40z + 25) + 8z$$

$$y = 48z^2 - 120z + 75 + 8z$$

$$y = 48z^2 - 112z + 75$$

11.)  $A$  in terms of  $B$ .

$$4A + 10B + 16C = 40 \rightarrow 4A = -10B - 16C + 40$$

$$2B - 4C = 10B + 24$$

$$A = -2.5B - 4C + 10$$

$$-4C = 8B + 24$$

$$A = -2.5B - 4(-2B - 6) + 10$$

$$C = -2B - 6$$

$$A = -2.5B + 8B + 24 + 10$$

$$A = 5.5B + 34$$

For 12-17, solve for the given variable. If necessary, leave your answer in simplest radical form

12.)  $x^2 + x = -24$

$x^2 + x + 24 = 0$  No factors

$$x = \frac{-1 \pm \sqrt{1^2 - 4(1)(24)}}{2}$$

$$= \frac{-1 \pm \sqrt{-95}}{2}$$
 No solution  $\pm 3$  missing

13.)  $3(x+5) + 5(x+2) = 0$

$3x + 15 + 5x + 10 = 0$

$8x + 25 = 0$

$8x = -25$

$x = \frac{-25}{8} = -3\frac{1}{8} = -3.125$

14.)  $2x^2 + 7x - 9 = 0$

$(2x+9)(x-1) = 0$

$x = -\frac{9}{2}, x = 1$

$$x = \frac{-7 \pm \sqrt{7^2 - 4(2)(-9)}}{4}$$

$$x = \frac{-7 \pm \sqrt{121}}{4}$$

$x = 1 \text{ or } -\frac{9}{2} = -4.5$

15.)  $-2(7x+15) = 18 + 2x$

$-14x - 30 = 18 + 2x$

$-16x = 48$

$x = -3$

$\pm 2$  dumb

16.)  $5x^2 - 760 = -7x^2 - 220$

$12x^2 = 540$

$\pm 4 \pm$

$x^2 = 45$

$x = \pm \sqrt{45}$

$x = \pm 3\sqrt{5}$

17.)  $18x^2 = 8x$

$18x^2 - 8x = 0$

$2x(9x - 4) = 0$

$2x = 0$

$x = 0$

$9x - 4 = 0$

$x = \frac{4}{9}$

$\pm 2 \quad (8x^2 = 8x)$

$\sqrt{\quad}$

$\pm 3 \div x$

$\pm 4 \quad \overline{44} / \pm 3 \quad 44$

18.) You are rock climbing and need to throw a rope up to your friend. They are standing on a ledge 15 feet above you. If you can throw the rope with an initial velocity of 25 feet per second from a height of 5 feet, will you be able to reach your friend? Why or why not?

$$h = -16t^2 + 25t + 5$$

$$15 = -16t^2 + 25t + 5$$

$$0 = -16t^2 + 25t - 10$$

$$b^2 - 4ac = 25^2 - 4(-16)(-10)$$

$$= -15$$

No, because the discriminant is negative.

MAX  
14.77 ft

+2 no plug in 15

For 19 and 20, determine the most efficient method for solving the quadratic equation (using square roots, factoring, or quadratic formula) and explain your reasoning. Be specific and thorough. **You do not need to solve the quadratic equation.**

19.)  $-18 = 5x^2 + x$

$$0 = 5x^2 + x + 18$$

Quad Formula. Std. Form,  $a \neq 1$ .

20.)  $7x^2 - 5 = -25 + 9x + 6x^2$

+4  $x^2$  Q.F.

$$x^2 - 9x + 20 = 0$$

Factoring. Std. Form,  $a = 1$ ,  $(x-4)(x-5)$

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