Algebra 1 Name Key

WS Unit 8 Review

Solve each equation by factoring.

1) $x^2 - 3x - 28 = 0$

-28: $4, -7$

$(x^2+4x)(-7x-28)=0$

$x(x+4)-7(x+4)=0$

$(x+4)(x-7)=0$

$x+4=0$ $\quad x-7=0$

$x=-4$ $\quad x=7$

	x	4
x	x^2	$4x$
-7	$-7x$	-28

2) $n^2 + 7n + 7 = 7$

$-7 \quad -7$

$n^2+7n=0$

$n(n+7)=0$

$n=0$ $\quad n+7=0$

$-7 \quad -7$

$n=-7$

3) $p^2 - 3p - 13 = 5$

$-5 \quad -5$

$p^2-3p-18=0$

-18: $3, -6$

$(p^2+3p)(-6p-18)=0$

$p(p+3)-6(p+3)=0$

$(p-6)(p+3)=0$

$p-6=0$ $\quad p=6$

$p+3=0$ $\quad p=-3$

	p	3
p	p^2	$3p$
-6	$-6p$	-18

4) $14n^2 + 33n - 8 = -3$

$+3 \quad +3$

$14n^2+33n-5=0$

-70: $-2, 35$

$(14n^2-2n)+(35n-5)=0$

$2n(7n-1)+5(7n-1)=0$

$(2n+5)(7n-1)=0$

$2n+5=0$ $\quad 7n-1=0$

$-5 \quad -5$ $\quad +1 \quad +1$

$\frac{2n}{2}=\frac{-5}{2}$ $\quad \frac{7n}{7}=\frac{1}{7}$

$n=-\frac{5}{2}$ $\quad n=\frac{1}{7}$

	$7n$	-1
$2n$	$14n^2$	$-2n$
5	$35n$	-5

Find the roots of each equation by taking square roots.

5) $9x^2 - 10 = 54$

$+10 \quad +10$

$\frac{9x^2}{9}=\frac{64}{9}$

$\sqrt{x^2}=\sqrt{\frac{64}{9}}$

$x=\pm\frac{\sqrt{64}}{\sqrt{9}}$

$x=\pm\frac{8}{3}$

$\frac{8}{3}, -\frac{8}{3}$

6) $9x^2 + 9 = 45$

$-9 \quad -9$

$\frac{9x^2}{9}=\frac{36}{9}$

$\sqrt{x^2}=\sqrt{4}$

$x=\pm 2$ $\quad 2, -2$

7) $6n^2 - 9 = 207$

$+9 \quad +9$

$\frac{6n^2}{6}=\frac{216}{6}$

$\sqrt{n^2}=\sqrt{36}$

$n=\pm 6$ $\quad 6, -6$

8) $9m^2 + 2 = 902$

$-2 \quad -2$

$\frac{9m^2}{9}=\frac{900}{9}$

$\sqrt{m^2}=\sqrt{100}$

$m=\pm 10$ $\quad 10, -10$

Find the x-intercepts of each equation using the quadratic formula.

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

9) $5n^2 + n - 84 = 0$

$a=5$, $b=1$, $c=-84$

b^2-4ac

$(1)^2-4(5)(-84)=1681$

$x=\frac{-1\pm\sqrt{1681}}{2(5)}$

$=\frac{-1\pm\sqrt{1681}}{10}$

$\frac{-1+\sqrt{1681}}{10}=4$

$\frac{-1-\sqrt{1681}}{10}=-4.2$

$x=4, -4.2$

10) $k^2 + 10k - 24 = 0$

$a=1$, $b=10$, $c=-24$

b^2-4ac

$(10)^2-4(1)(-24)=196$

$x=\frac{-10\pm\sqrt{196}}{2(1)}$

$=\frac{-10\pm\sqrt{196}}{2}$

$\frac{-10+\sqrt{196}}{2}=2$

$\frac{-10-\sqrt{196}}{2}=-12$

$x=2, -12$

11) $4x^2 - 11x + 8 = 2$
$-2 \quad -2$
$4x^2 - 11x + 6 = 0$
$a = 4$, $b = -11$, $c = 6$
$b^2 - 4ac$
$(-11)^2 - 4(4)(6) = 25$
$X = \frac{-(-11) \pm \sqrt{25}}{2(4)}$
$= \frac{11 \pm \sqrt{25}}{8}$
$\frac{11+\sqrt{25}}{8} = 2$ $\quad \frac{11-\sqrt{25}}{8} = \frac{6}{8} = 0.75$
X = 2, 0.75

12) $2r^2 + 7r - 70 = -10$
$+10 \quad +10$
$2r^2 + 7r - 60 = 0$
$a = 2$, $b = 7$, $c = -60$
$b^2 - 4ac$
$(7)^2 - 4(2)(-60) = 529$
$X = \frac{-7 \pm \sqrt{529}}{2(2)}$
$X = \frac{-7 \pm \sqrt{529}}{4}$
$\frac{-7+\sqrt{529}}{4} = 4$ $\quad \frac{-7-\sqrt{529}}{4} = -7.5$
X = 4, -7.5

13) An Olympic diver's height can be modeled by the function $h = -3x^2 + 6x + 24$, where x is the time in seconds after he begins the dive.

a) How long does it take the diver to hit the water?
water = height = 0
$0 = -3x^2 + 6x + 24$
$a = -3$, $b = 6$, $c = 24$
$b^2 - 4ac$
$(6)^2 - 4(-3)(24) = 324$
$X = \frac{-6 \pm \sqrt{324}}{2(-3)}$
$= \frac{-6 \pm \sqrt{324}}{-6}$
$\frac{-6+\sqrt{324}}{-6} = -2$
$\frac{-6-\sqrt{324}}{-6} = 4$
X = 4 sec

b) What is the initial height of the swimmer?
c value
24 ft

c) What is the maximum height of the swimmer?
vertex $X = \frac{-b}{2a}$
$X = \frac{-6}{2(-3)}$
$= \frac{-6}{-6} = 1$
$X = 1$ $\quad h = -3(1)^2 + 6(1) + 24$
$= 27$
(1, 27)
max = 27 ft

d) How long does it take for the swimmer to reach its maximum height?
vertex (1, 27)
time to max height = X of vertex
1 sec

14) As Molly dives into her pool, her height above the water can be modeled by the function $f(x) = -16x^2 + 72x$, where x is the time in seconds after she begins diving. How long does it take Molly to reach the pool?
pool = ground = 0
$0 = -16x^2 + 72x$
$a = -16$, $b = 72$, $c = 0$
$b^2 - 4ac$
$(72)^2 - 4(-16)(0) = 5184$
$X = \frac{-72 \pm \sqrt{5184}}{2(-16)}$
$X = \frac{-72 \pm \sqrt{5184}}{-32}$
$\frac{-72+\sqrt{5184}}{-32} = 0$ $\quad \frac{-72-\sqrt{5184}}{-32} = 4.5$
4.5 sec

15) A diver begins on a platform 11 meters above the surface of the water. The diver's height is given by the equation $h(t) = -2t^2 + t + 11$, where t is the time in seconds after the diver jumps. How long does it take the diver to reach a point 1 meter above the water?

$h = 1$ $\quad 1 = -2t^2 + t + 11$

$-1 \qquad -1$

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

$a = -2 \quad b = 1 \quad c = 10$

$b^2 - 4ac$

$(1)^2 - 4(-2)(10) = 81$

$x = \frac{-1 \pm \sqrt{81}}{2(-2)}$

$x = \frac{-1 \pm \sqrt{81}}{-4}$

$\frac{-1 + \sqrt{81}}{-4}$ $\quad$ $\frac{-1 - \sqrt{81}}{-4}$

2.5 sec $\quad$ -2 $\quad$ 2.5

16) Use the graph below to answer each question.

a) What is the initial height of the object? (y-int)

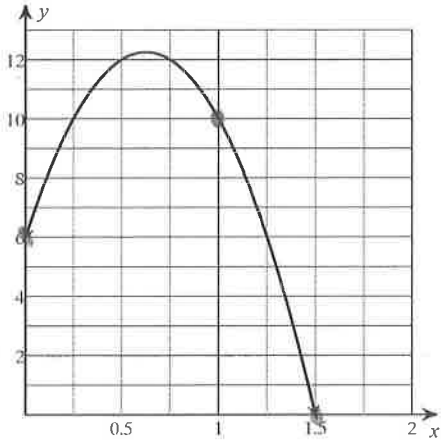
6 units

b) How high is the object after 1 second?

10 units $\quad$ (1, 10)

c) How long is the object in the air? (x-ax15)

1.5 sec



17) The volume of a rectangular prism is 1664 cubic inches. The height of the prism is 13 inches. The length of the prism is twice the width. Find the length and width of the rectangular prism.

$V = 1664$

$l = 2x$

$w = x$

$h = 13$

$V = lwh$

$1664 = 2x \cdot x \cdot 13$

$\frac{1664}{26} = \frac{26x^2}{26}$

$\sqrt{64} = \sqrt{x^2}$

$\pm 8 = x$

$8, -8$

$x = 8$

$w = 8$ in

$l = 16$ in