*square of a # is "

Name: Key *product means to multiply

8A; Algebra 1

Date:_____

Period_____

Quadratic Word Problems

(Use LESC)

1) The square of a number decreased by 4 times the number equals 21. Find the number.

L

Let x = the #

E

$x^2 - 4x = 21$

$-21 \quad -21$

$x^2 - 4x - 21 = 0$

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

$x-7=0$	$x+3=0$
$+7 \quad +7$	$-3 \quad -3$
$x=7$	$x=-3$

S

The number is 7 or -3

C

$(7)^2 = 49$

$4(7) = 28$

$49 - 28 = 21$ ✓

$(-3)^2 = 9$

$4(-3) = -12$

$9 - -12 = 21$ ✓

2) A certain number added to its square is 30. Find the number.

L

Let x = the #

E

$x + x^2 = 30$

$-30 \quad -30$

$x^2 + x - 30 = 0$

$(x+6)(x-5) = 0$

$x+6=0$	$x-5=0$
$-6 \quad -6$	$+5 \quad +5$
$x=-6$	$x=5$

S

The number is -6 or 5

C

$(-6)^2 = 36$

$-6 + 36 = 30$ ✓

$(5)^2 = 25$

$25 + 5 = 30$ ✓

3) The product of two positive consecutive even integers is 80. Find the integers

L

Let

x = 1st CPEI

x+2 = 2nd CPEI

E

$x(x+2) = 80$

$x^2 + 2x = 80$

$-80 \quad -80$

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

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

$x+10=0$	$x-8=0$
$-10 \quad -10$	$+8 \quad +8$
$x=-10$	$x=8$
$x+2=-8$	$x+2=10$

reject: must be positive

S

The two pos. CPEIs are 8 & 10

C

$8(10) = 80$ ✓

Classwork

4) Find two positive numbers in the ratio 2:3 whose product is 2,400.

L	E	S	C
Let $2x$ = smaller positive # $3x$ = larger positive #	$(2x)(3x) = 2400$ $\frac{6x^2}{6} = \frac{2400}{6}$ $\sqrt{x^2} = \sqrt{400}$ $x = \pm 20$ $x = 20$: $2x = 40$, $3x = 60$ $x = -20$: $2x = -40$, $3x = -60$ reject must be positive	Two positive #'s that are in the ratio 2:3 are 40 & 60	$\frac{2}{3} = \frac{40}{60}$ $120 = 120$ $40(60) = 2400$ ✓

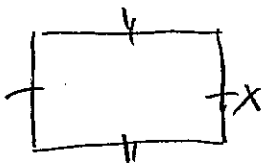
Classwork

5) Find three consecutive positive integers such that the product of the second integer and the third integer is 20.

L	E	S	C
let x = 1st CPI $x+1$ = 2nd CPI $x+2$ = 3rd CPI	$(x+1)(x+2) = 20$ $x^2+2x+1x+2 = 20$ $x^2+3x+2 = 20$ $-20 \quad -20$ $x^2+3x-18 = 0$ $(x+6)(x-3) = 0$ $x+6=0$, $-6-6$, $x=-6$, $x+1=-5$, $x+2=-4$ reject must be pos. $x-3=0$, $+3+3$, $x=3$, $x+1=4$, $x+2=5$	The three consecutive positive integers are 3, 4, 5	$(4)(5) = 20$ ✓

Homework

6) The length of a rectangular garden is 4 meters more than its width. the area of the garden is 60 square meters. Find the dimensions of the garden.

L	E	S	C
let x = the width of the rectangular garden $x+4$ = the length of the rectangular garden  x, $x+4$ $A = LW$	$x(x+4) = 60$ $x^2+4x = 60$ $-60 \quad -60$ $x^2+4x-60 = 0$ $(x+10)(x-6) = 0$ $x+10=0$, $-10-10$, $x=-10$, $x+4=-6$ Reject, can't have Neg. dimensions $x-6=0$, $+6+6$, $x=6$, $x+4=10$	the width of the rectangle is 6 m and the length of the rectangle is 10 m	$6+4=10$ 10 $\times 6$ $60 m^2$

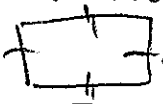
hmwk

7:5

7) The ratio of the measures of the length and width of a rectangle is 7:5. The area of the rectangle is 1,715 square feet. Find the dimensions of the rectangle.

L

Let
$7x$ = the length of the rectangle
$5x$ = the width of the rectangle



$A = L \cdot W$

E

$(5x)(7x) = 1715$

$\frac{35x^2}{35} = \frac{1715}{35}$

$\sqrt{x^2} = \sqrt{49}$

$x = \pm 7$

$x = 7$: $5x = 35$, $7x = 49$

$x = -7$: $5x = -35$, $7x = -49$ Reject can't have neg. dimension

S

The length of the rectangle is 49 ft & the width of the rectangle is 35 ft

C

$245 = 245$ ✓

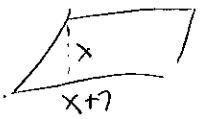
$(49)(35) = 1715$

reasonable

8) The base of a parallelogram measures 7 centimeters more than its altitude. If the area of the parallelogram is 30 square centimeters, find the measure of its base and the measure of its altitude. altitude = height

L

Let
x = the altitude of the parallelogram
$x+7$ = the base of the parallelogram



$A = b \cdot h$

E

$x(x+7) = 30$

$x^2 + 7x = 30$

$-30 \quad -30$

$x^2 + 7x - 30 = 0$

$(x+10)(x-3) = 0$

$x+10 = 0$: $-10 \quad -10$, $x = -10$, $x+7 = -3$ Reject can't have neg. dimension

$x-3 = 0$: $+3 \quad +3$, $x = 3$, $x+7 = 10$

S

The altitude of the parallelogram is 3 cm & the base of the parallelogram is 10 cm

C

$3+7 = 10$ ✓

$10(3) = 30$ ✓

hmwk

9) One number is 5 more than another. Their product is 14. Find the numbers.

L

Let
x = the smaller #
$x+5$ = the larger #

E

$x(x+5) = 14$

$x^2 + 5x = 14$

$-14 \quad -14$

$x^2 + 5x - 14 = 0$

$(x+7)(x-2) = 0$

$x+7 = 0$: $-7 \quad -7$, $x = -7$, $x+5 = -2$

$x-2 = 0$: $+2 \quad +2$, $x = 2$, $x+5 = 7$

S

The #s are -7 and 2 OR 2 & 7

C

$-7+5 = -2$ ✓

$(-7)(-2) = 14$ ✓

$2+5 = 7$ ✓

$2(7) = 14$ ✓

Classwork

10) Find the smallest of three consecutive positive integers such that the product of the two smaller integers is 38 more than twice the largest.

L

Let
x = 1st CPI (smallest)
$x+1$ = 2nd CPI (middle)
$x+2$ = 3rd CPI (largest)

E

$x(x+1) = 2(x+2)+38$
$x^2 + x = 2x + 4 + 38$
$x^2 + x = 2x + 42$
$-2x-42 \quad -2x \quad -42$
$x^2 - 1x - 42 = 0$
$(x-7)(x+6) = 0$

$x-7=0$	$x+6=0$
$+7+7$	$-6-6$
$x=7$	$x=-6$
$x+1=8$	$x+1=-5$
$x+2=9$	$x+2=-4$

Reject NOT positive

S

The three CPIs are
7, 8, 9
The smallest CPI is 7

C

$7 \cdot 8 = 56$
$2(9) = 18$ ✓
$18+38 = 56$

Optional

11) Nine times a certain number is 5 less than twice the square of the number. Find the number.

L

Let
x = the #

E

$9x = 2x^2 - 5$
$-9x \quad -9x$
$0 = 2x^2 - 9x - 5$
$2x^2 - 9x - 5 = 0$
$\frac{2x}{2} - 10 \quad (2x+1) = 0$

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

$x-5=0$	$2x+1=0$
$+5+5$	$-1-1$
$x=5$	$\frac{2x}{2} = \frac{-1}{2}$
	$x = -\frac{1}{2}$

S

The # is
5 or $-\frac{1}{2}$

C

$9 \cdot 5 = 45$
$5^2 = 25$ ✓
$2(25) = 50$
$50 - 5 = 45$

$9\left(-\frac{1}{2}\right) = -4\frac{1}{2}$
$\left(-\frac{1}{2}\right)^2 = \frac{1}{4}$
$2\left(\frac{1}{4}\right) = \frac{1}{2}$
$\frac{1}{2} - 5 = -4\frac{1}{2}$