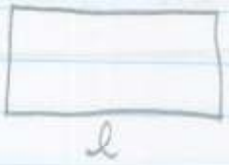
November 28, 2007

Word Problems

① You have a rectangle of perimeter 440 cm and an area of 3025 cm^2. What are its dimensions?



$3025 = l \cdot w$
$2l + 2w = 440$
$2l = 440 - 2w$
$l = 220 - w$

sub $l = 220 - w$ into $3025 = l \cdot w$

$3025 = (220 - w)(w)$
$3025 = 220w - w^2$
$w^2 - 220w + 3025 = 0$

$$w = \frac{220 \pm \sqrt{(-220)^2 - 4(1)(3025)}}{(2)1}$$

$$= \frac{220 \pm \sqrt{36300}}{2}$$

$$= \frac{220 \pm 110\sqrt{3}}{2}$$

$w = 110 \pm 55\sqrt{3}$

$l = 220 - w$
$= 220 - (110 \pm 55\sqrt{3})$
$= 110 \pm 55\sqrt{3}$

Hilroy

② Find "m" to make the following a perfect square

$y = x^2 + (m+1)x + 3m - 5$

$\left(\frac{m+1}{2}\right)^2 = 3m - 5$

$x^2 + 10x + 25$
$(x+5)^2$
(half middle)^2 = last

$\frac{m^2+2m+1}{4} = 3m - 5$

$m^2 + 2m + 1 = 12m - 20$

$m^2 - 10m + 21 = \emptyset$ $\quad m=3,\ m=7$

$(m-3)(m-7) = \emptyset$

* Factorable when discriment is a perfect square.

④ A rectangle has a length of 5cm more than the width. The area is 405 cm^2. Find length and width.

$l = w + 5$
$405 = lw$
$405 = (w+5)(w)$
$405 = w^2 + 5w$

$w^2 + 5w - 405 = \emptyset$

$w = \frac{-5 \pm \sqrt{5^2 - 4(1)(-405)}}{2(1)}$

$= \frac{-5 \pm \sqrt{1645}}{2}$

$l = \frac{-5 \pm \sqrt{1645}}{2} + \frac{10}{2}$

$= \frac{5 \pm \sqrt{1645}}{2}$

⑤ The sum of a (±) # + its square is 15. Find #

$a^2 + a = 15$

$a^2 + a - 15 = 0$

$a = \frac{-1 \pm \sqrt{1-4(1)(-15)}}{2(1)}$

$= \frac{-1 \pm \sqrt{61}}{2}$ $= \frac{-1+\sqrt{61}}{2}$

⑥ Two consecutive even integers have squares that differ by 220. Find #s

$x+2$

$(x+2)^2 - (x\ \ )^2 = 220$

$x^2 + 4x + 4 - x^2 = 220$

$4x + 4 = 220$

$4x = 216$

$x = 54$

$54 + 56$