Ch 1 Word problems
↳ each eqⁿ is linear

Ch (before this)
↳ max/min
→ vertex

Ch 6 (now)
↳ quadratics

Anna Denisova Section 6.5 - Word Problems Nov 28, 22

STEPS
① let statements
② create 2 equations ☆
③ substitute → goal: eqⁿ with 1 variable
④ Solve by @ Factoring
⑥ Quadratic formula
⑤ Write a ∴ statement

① The sum of two positive numbers is 12. If their product is 35, find the numbers.

let x represent num 1
let y represent num 2

① $x+y=12 \rightarrow x=12-y$
② $xy=35$

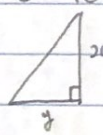
sub x into ②
$y(12-y)=35$
$12y-y^2=35$
$-y^2+12y-35=0$
$y^2-12y+35=0$
$(y-7)(y-5)=0$
$y=5,7$

sub y into ①
$x=7$

← check that BOTH answers are VALID

∴ The numbers are 5 & 7

hypotenuse ② The hyp of a right angled triangle is 10m. One of the other sides is 2m longer than the third side. Find the length of all three sides.



let x represent the first side (m)
let y represent the second side (m)

① $y=x+2$
② $x^2+y^2=100$

$100=10^2$ pythag

sub y into ②
$x^2+(x+2)^2=100$
$x^2+x^2+4x+4=100$
$2x^2+4x-96=0$
$2(x^2+2x-48)=0$
$2(x+8)(x-6)=0$
$x=-8,6$

$x=6$
Sub x into ①
$y=8$

∴ The three sides are 6, 8, 10

∵ $x>0$ ∴ $x \neq 8$

☆ ONLY 6 is valid, can't be negative

③ The area of a rectangular field is $2275\ m^2$. The field is enclosed by 200m of fencing. What are the dimensions of the field?

Let l represent the length
Let w represent the width

① $lw = 2275$

② $2l + 2w = 200 \rightarrow l + w = 100 \rightarrow l = 100 - w$ (③)

Sub l into ①

$w(100 - w) = 2275$

$100w - w^2 = 2275$

$w^2 - 100w + 2275 = 0$

factorable but...

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

$w = \frac{100 \pm \sqrt{10000 - 4(2275)}}{2}$

$w = \frac{100 \pm \sqrt{10000 - 9100}}{2}$

$w = \frac{100 \pm \sqrt{900}}{2}$

$w = \frac{100 \pm 30}{2}$

$w = 50 \pm 15$

$w_1 = 35$
$w_2 = 65$

Sub w into ③ check !

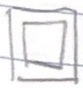
$l = 100 - 35$
$l = 65$

∴ The dimensions are $35m \times 65m$

Homework: WORD PROBLEMS (row 94)

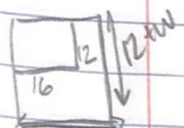
Anna Denisova Word Problems – Part 2 Nov 25, 2022

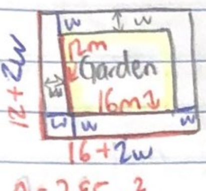
picture frames
↳ matt



eg. A garden measuring 12m × 16m is to have a pathway installed around it. The pathway is of equal width all the way around. The new total area will be $285m^2$. What is the width of the pathway?

eg





$A = 285m^2$

let w represent the width of the pathway (m)

① $285 = (16+2w)(12+2w)$ — one eq^n

$285 = 192 + 56w + 4w^2$ — exp.

$0 = 4w^2 + 56w - 93$ — set to zero

$0 = (2w-3)(2w+31)$ — factor

$w = 3/2, -31/2$

∵ $-31/2$ is negative ∴ $w = 3/2$

∴ The width of the pathway is 1.5m.

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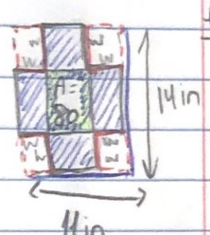
eg. You have to make an open topped box with a base area of $80in^2$. You will be taking a 11 in × 14 in piece of cardboard and cutting equal size squares from each corner, scoring the edges and folding up the box. What should be the dimensions of the squares you cut? Approx your answer.



let w represent the width of the squares (in)

① $80 = (11-2w)(14-2w)$

$80 = 4w^2 - 50w + 154$

$0 = 4w^2 - 50w + 74$

$0 = 2(2w^2 - 25w + 37)$

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

$w = \frac{25 \pm \sqrt{625 - 4(2)(37)}}{4}$

$w = \frac{25 \pm \sqrt{625-296}}{4}$

$w = \frac{25 \pm \sqrt{329}}{4}$

$w \approx \frac{25 \pm 18.1}{4}$

$w_1 \approx \frac{25+18.1}{4}$ ≈ 10.78 (not enough paper) 11-20?

CAN'T BE THIS ONE SINCE PAPER IS 11in×14

$w_2 \approx \frac{25-18.1}{4}$ ≈ 1.74

∵ $2w_1 > 11$ ∴ Impossible

∴ the dim of the squares are 1.74in × 1.74in.

$625 - 296 = 329$; $18 \times 18 = 324$