Section 6.5 – Practice Problems

1. The length of a rectangle is $4m$ more than the width. The area is $320m^2$. Find the length and the width.

$l = 4 + w$

$w = w$

$l \cdot w = 320$

$(4+w)w = 320$

$w^2 + 4w - 320 = 0$

$(w+20)(w-16) = 0$

$w = -20$ ← reject

$w = +16$

$w = 16$

$l = 20$

320

2 ^ 160

2 ^ 80

2 ^ 40

2 ^ 20

2. Find two consecutive odd whole numbers such that the sum of their squares is 130.

Let x be odd

$x+2$ is a consecutive odd numbers

$x^2 + (x+2)^2 = 130$

$x^2 + x^2 + 4x + 4 = 130$

$2x^2 + 4x - 126 = 0$

$x^2 + 2x - 63 = 0$

$(x+9)(x-7)$

$x = -9$ ← reject, not whole number

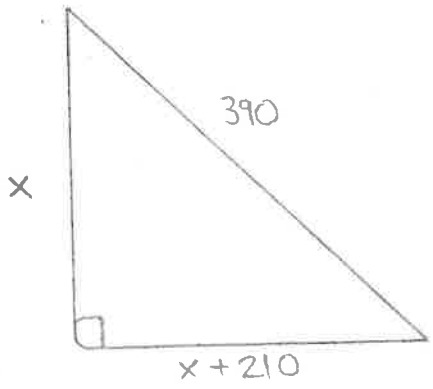
$x = 7$

so $x = 7$

$x+2 = 9$

7, 9

3. Two planes travel at right angles to each other after leaving an airport at the same time; 1 hour later, they are $390km$ apart. If one plane travels $210km/h$ faster than the other, what is the speed of the slower plane?



$x^2 + (x+210)^2 = 390^2$

$x^2 + x^2 + 420x + 44100 - 152100 = 0$

$2x^2 + 420x - 108000 = 0$

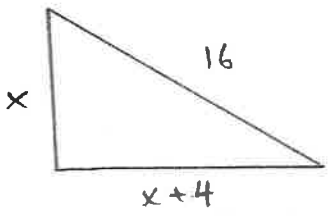
$x^2 + 210x - 54000 = 0$

$(x+360)(x-150) = 0$

$x = -360$ or 150 ↑ reject

$x = 150$ km/h

4. The hypotenuse of a right triangle is $16cm$ long. One leg is $4cm$ longer than the other. Find the length of the legs.



$x^2 + (x+4)^2 = 16^2$

$x^2 + x^2 + 8x + 16 = 256$

$2x^2 + 8x - 240 = 0$

$x^2 + 4x - 120 = 0$

$\frac{-4 \pm \sqrt{16 - 4(1)(-120)}}{2}$

$\frac{-4 \pm \sqrt{496}}{2}$

$x = 9.14$ or $x = -13.14$ ← reject

$x = 9.14$

$x + 4 = 13.14$

120
2 ^ 60
2 ^ 30
2 ^ 15
3 ^ 5

5. The length and width of a rectangular sheet of plywood is $4ft$ *by* $8ft$. How much must be added equally to the length and width to double the area?

$4 \cdot 8 = 32$

$(4+x)(8+x) = 64$

$x^2 + 12x + 32 = 64$

$x^2 + 12x - 32 = 0$

$\frac{-12 \pm \sqrt{144 - 4(1)(-32)}}{2}$

$\frac{-12 \pm \sqrt{272}}{2} = \frac{-12 \pm 4\sqrt{17}}{2} = -6 \pm 2\sqrt{17}$

$x = 2.25$

$x = -14.25$ ← reject

need to add 2.25 ft

6. A boat takes 1 hour longer to go $36km$ up a river than to go down the river. If the boat travels $15km/hr$ in still water, what is the speed of the current?

$d_1 = 36$ $s_1 = 15 + x$ (down river)

$d_2 = 36$ $s_2 = 15 - x$ (up river)

$t = \frac{d}{s} \rightarrow st = d$

$t_1 = \frac{d}{s}$ $st_1 = d$

$t_2 = \frac{d}{s}$ $st_2 = d$

$t_1 - t_2 = -1$

$\frac{36}{15+x} - \frac{36}{15-x} = -1$

$36(15-x) - [36(15+x)] = -(15+x)(15-x)$

$540 - 36x - 540 - 36x = -225 + x^2$

$x^2 + 72x - 225 = 0$

$(x-3)(x+75) = 0$

$x = 3$

$x = -75$ ← reject

$x = 3$ km/hr (speed of current)