MAT 099 §5.8 #s 1, 4, 5, 10, 15, 17, 21, 37, 51, 69*, 73, 79

* The zero factor property only works if the right hand side is zero!

SOLVE

(1) $(x+3)(3x-4)=0$

→ $x+3=0$ OR $3x-4=0$

$\boxed{x=-3}$ OR $3x=4$, $\boxed{x=\frac{4}{3}}$

(4) $8(3x-4)(2x-7)=0$

$3x-4=0$ OR $2x-7=0$

$3x=-4$ $\quad$ $2x=7$

$\boxed{x=-\frac{4}{3} \text{ OR } x=\frac{7}{2}}$

(5) $x^2+11x+24=0$

$x^2+8x+3x+24=0$

$x(x+8)+3(x+8)=0$

$(x+8)(x+3)=0$

$\boxed{x=-8 \text{ OR } x=-3}$

(10) $n^2+n=72$

$n^2+n-72=0$

$(9)(-8)=-72$ ✓

$9-8=1$ ✓

$n^2+9n-8n-72=0$

$n(n+9)-8(n+9)=0$

$(n+9)(n-8)=0$

$\boxed{n=-9 \text{ OR } n=8}$

(15) $\frac{z^2}{6}-\frac{z}{2}-3=0$

LCD = 6

METHOD 1: CLEAR FRACTIONS

METHOD 2: WRITE Everything over the LCD = 6.

MAT 099 §5.8 #s 15, 17, 21, 37, 51, 69, 73, 79

(15 cont'd)

METHOD 1

LCD = 6:

$\frac{z^2}{6} - \frac{z}{2} \cdot \frac{3}{3} - \frac{3}{1} \cdot \frac{6}{6} = 0$

$\frac{z^2 - 3z - 18}{6} = 0$

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

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

$\boxed{z = 6 \text{ OR } z = -3}$

METHOD 2

LCD = 6:

$\frac{6}{1} \cdot \frac{z^2}{6} - \frac{6}{1} \cdot \frac{z}{2} - \frac{6}{1} \cdot \frac{3}{1} = 0$

$\frac{\cancel{6}}{1} \cdot \frac{z^2}{\cancel{6}} - \frac{6}{1} \cdot \frac{z}{2} - \frac{6}{1} \cdot \frac{3}{1} = 0$

$\frac{z^2}{1} - \frac{3 \cdot \cancel{2} \cdot z}{1 \cdot \cancel{2}} - 18 = 0$

← $z^2 - 3z - 18 = 0$, etc.

(17) $\frac{x^2}{2} + \frac{x}{20} = \frac{1}{10}$

2⌊20
2⌊10
5

2⌊10
5

2

LCD = 20

LCD = 2 · 2 · 5 = 20

$\frac{x^2}{2} \cdot \frac{10}{10} + \frac{x}{20} = \frac{1}{10} \cdot \frac{2}{2}$

$\frac{10x^2}{20} + \frac{x}{20} = \frac{2}{20}$

$10x^2 + x = 2$

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

$(10)(-2) = -20$

FACTORS	SUM
$(-5)(4)$	-1
$(-4)(5)$	$+1$

Yes

$10x^2 - 4x + 5x - 2 = 0$

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

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

$\boxed{x = \frac{2}{5} \text{ OR } x = -\frac{1}{2}}$

MAT 099 §5.8 #s 21, 37, 51, 69, 73, 79

(21) $(4x+9)(x-4)(x+1) = 0$

$4x+9=0$ OR $x-4=0$ OR $x+1=0$

$4x=-9$

$\boxed{x=-\frac{9}{4} \text{ OR } x=4 \text{ OR } x=-1}$

(37) $w^2-5w=36$

$w^2-5w-36=0$

$w^2-9w+4w-36=0$

$w(w-9)+4(w-9)=0$

$(w-9)(w+4)=0$

$\boxed{w=9 \text{ OR } w=-4}$

FACTORS OF −36 whose Sum is −5

FACTORS	Sum
$(-3)(12)$	9
$(9)(-4)$	$9-4=5$
$(-9)(4)$	$-9+4=-5$ ✓

(51) $y^2+\frac{1}{4}=-y$

LCD = 4

$4y^2+4\cdot\frac{1}{4}=(4)(-y)$

$4y^2+1=-4y$

$4y^2+4y+1=0$

$(2y)^2$ ↑, $(2)(2y)(1)=4y$ Nice ↑, 1^2 ↑

$4y^2+4y+1=0$

$(2y+1)^2=0$

$2y+1=0$

$2y=-1$

$\boxed{y=-\frac{1}{2}}$

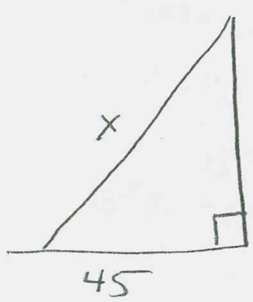
MAT 099 §5.8 #s 69, 73, 79

(69) Which solution strategies are incorrect? Why?

(a) Solve $(y-2)(y+2)=4$ by setting each factor equal to 4. INCORRECT. That trick only works if the right hand side is zero.

(d) Solve $x^2+6x+8=10$ by factoring x^2+6x+8 and setting each factor equal to 10. INCORRECT, for the same reason (a) was.

(73) An electrician needs to run a cable from the top of a 60-foot tower to a transmitter located 45 feet away from the base of the tower. How long should he make the cable?



By Pythagorus,

$$45^2+60^2=x^2$$

$$5625=x^2$$

$$\sqrt{5625}=\sqrt{x^2} \Longrightarrow$$

FACT: $\sqrt{x^2}=|x|$ & $|x|=\sqrt{5625}$ means $x=\pm\sqrt{5625}$

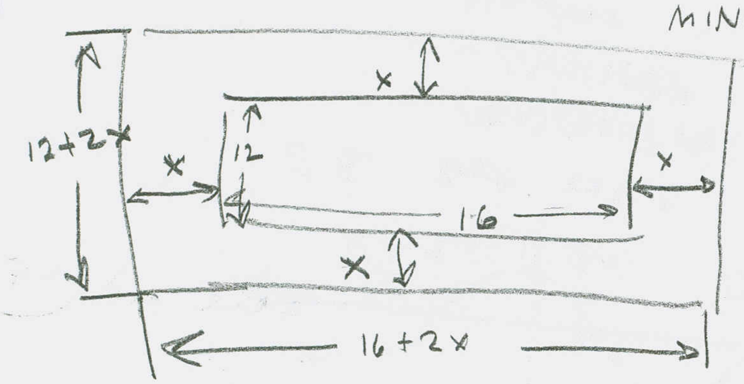
we take the positive one; $x = 75$ feet

MAT 099 § 5.8 # 79

(79) Marie has a rectangular board 12 inches by 16 inches around which she wants a uniform border of shells. If she has enough shells to cover 128 square inches, determine the width of the border.

THOUGHT PROCESS

AREA OF BORDER = AREA OF BOARD WITH BORDER MINUS AREA OF BOARD ALONE



Let x = width of the border (inches)

$128 = (16+2x)(12+2x) - (12)(16)$

$128 = 192 + 32x + 24x + 4x^2 - 192$

$128 = 4x^2 + 56x$

$4x^2 + 56x - 128 = 0$

$2(2x^2 + 28x - 64) = 0$ ← MISSED THE GCF, SO I Kept factoring

$2x^2 + 28x - 64 = 0$

$2(x^2 + 14x - 32) = 0$

$x^2 + 14x - 32 = 0$

$x^2 + 16x - 2x - 32 = 0$

$x(x+16) - 2(x+16) = 0 \Rightarrow (x+16)(x-2) = 0$

$(16)(-2) = -32$ ✓

$16 - 2 = 14$ ✓

$x = -16$ or $x = 2$ inches

x = 2 inches does the trick

CHECK $(16+2(2))(12+2(2)) - 192$

$= (16+4)(12+4) - 192 = (20)(16) - 192$

$= 128$ square inches ✓