

Practice Test

A. Factoring the Following Expressions [Non-Calculator]

$$1. \quad 6x^5y^2z^3 - 15x^3y^4z^7$$

$$= 3x^3y^2z^3(2x^2 - 5y^2z^4)$$

$$2. \quad x^2 - 6x - 27$$

$$= (x - 9)(x + 3)$$

$$3. \quad x^2 + 24x + 23$$

$$= (x + 23)(x + 1)$$

$$4. \quad 15x^2 - xy - 2y^2$$

$$= (5x - 2y)(3x + y)$$

$$\begin{array}{r} 5 \overline{) 12} \\ \underline{10} \\ 2 \\ \underline{2} \\ 0 \end{array}$$

$$5. \quad 7x^2 + 36x + 5$$

$$= (7x + 1)(x + 5)$$

$$6. \quad \frac{1}{2}x^2 + \frac{5}{2}x + 3 = \frac{1}{2}(x^2 + 5x + 6)$$

$$= \frac{1}{2}(x + 2)(x + 3)$$

$$\begin{array}{r} 7 \overline{) 1} \\ \underline{1} \\ 0 \end{array}$$

$$7. \quad 12x(5x + 2) - 15y(5x + 2) + 21z(5x + 2)$$

$$= (5x + 2)(12x - 15y + 21z)$$

$$= 3(5x + 2)(4x - 5y + 7z)$$

$$8. \quad 25(5x + 4)^2 - 5(5x + 4) - 6$$

$$25a^2 - 5a - 6$$

$$(5a + 2)(5a - 3)$$

$$= (25x + 20 + 2)(25x + 20 - 3)$$

$$= (25x + 22)(25x + 17)$$

$$\begin{array}{r} 5 \overline{) 12} \\ \underline{10} \\ 2 \\ \underline{2} \\ 0 \end{array}$$

$$9. \quad (2x + 7)y^2 - (2x + 7)x^2$$

$$= (2x + 7)(y^2 - x^2)$$

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

$$10. \quad 4(2x - y)^2 - 25z^2$$

$$= (2(2x - y) - 5z)(2(2x - y) + 5z)$$

$$= (4x - 2y - 5z)(4x - 2y + 5z)$$

$$11. \quad 144 - (3x - 7)^2$$

$$= (12 + 3x - 7)(12 - 3x + 7)$$

$$= (3x + 5)(19 - 3x)$$

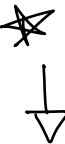


$$12. \quad (5x - 2)^2 - (3x - 4)^2$$

$$= (5x - 2 + 3x - 4)(5x - 2 - 3x + 4)$$

$$= (8x - 6)(2x + 2)$$

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



B. Solve the following questions by factoring [Non-Calculator]

1. $6y^2 - 15y = 0$

$$3y(2y - 5) = 0$$

$$y = 0 \quad y = \frac{5}{2}$$

2. $x^2 + 6x - 27 = 0$

$$(x + 9)(x - 3) = 0$$

$$x = -9, 3$$

3. $x^2 - 7x + 12 = 0$

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

$$x = 4, 3$$

4. $x^2 - 2x - 48 = 0$

$$(x - 8)(x + 6) = 0$$

$$x = 8, -6$$

5. $15x^2 - x - 2 = 0$

$$(5x - 2)(3x + 1) = 0$$

$$x = \frac{2}{5}, -\frac{1}{3}$$

6. $x^2 + 36x = 0$

$$x(x + 36) = 0$$

$$x = 0, -36$$

7. $5x^2 - 80 = 0$

$$x^2 - 16 = 0$$

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

$$x = \pm 4$$

8. $6x^2 + 11x = 10$

$$6x^2 + 11x - 10 = 0$$

$$(2x + 5)(3x - 2) = 0$$

$$x = -\frac{5}{2}, x = \frac{2}{3}$$

9. $(4x - 5)(3x + 7) = 0$

$$4x - 5 = 0 \quad 3x + 7 = 0$$

$$4x = 5 \quad 3x = -7$$

$$x = \frac{5}{4} \quad x = -\frac{7}{3}$$

10. $(x - 2)(x + 3) = 14$

$$x^2 + x - 6 - 14 = 0$$

$$x^2 + x - 20 = 0$$

$$(x + 5)(x - 4) = 0$$

$$x = -5, 4$$

$$\frac{5}{3} \pm \frac{1}{1}$$

$$\frac{2}{3} \pm \frac{5}{2}$$

C. Solve the following questions by completing the square

1. $x^2 + 6x - 10 = 0$ [Non-Calculator]
 $x^2 + 6x + 9 - 9 - 10 = 0$
 $(x + 3)^2 = 19$
 $x + 3 = \pm\sqrt{19}$
 $x = -3 \pm \sqrt{19}$

2. $\frac{1}{3}x^2 - 2x - 13 = 0$ [Non-Calculator]
 $x^2 - 6x - 39 = 0$
 $x^2 - 6x + 9 - 9 - 39 = 0$
 $(x - 3)^2 = 48$
 $x - 3 = \pm\sqrt{48}$
 $x = 3 \pm 4\sqrt{3}$

3. $3x^2 + 12x - 24 = 0$ [Non-Calculator]
 $x^2 + 4x - 8 = 0$
 $x^2 + 4x + 4 - 4 - 8 = 0$
 $(x + 2)^2 = 12$
 $x + 2 = \pm\sqrt{12}$
 $x = -2 \pm 2\sqrt{3}$

4. $0.25x^2 + 5.25x - 17.35 = 0$ [Calc]
 $0.25(x^2 + 21x - 69.4) = 0$
 $0.25(x^2 + 21x + 110.25 - 110.25) - 17.35 = 0$
 $0.25(x + 10.5)^2 - 27.5625 - 17.35 = 0$
 $0.25(x + 10.5)^2 = 44.9125$
 $(x + 10.5)^2 = 179.65$
 $x + 10.5 = \pm\sqrt{179.65}$
 $x = 2.90, -23.90$

D. Solve the following using the Quadratic formula

1. $x^2 + 5x - 7 = 0$ [Non-Calculator]
 $x = \frac{-5 \pm \sqrt{25 - 4(-7)}}{2}$
 $= \frac{-5 \pm \sqrt{53}}{2}$

2. $2x^2 - 2x - 5 = 0$ [Non-Calculator]
 $x = \frac{2 \pm \sqrt{4 - 4(2)(-5)}}{4} = \frac{2 \pm 2\sqrt{11}}{4}$
 $= \frac{2 \pm \sqrt{44}}{4} = \frac{1 \pm \sqrt{11}}{2}$

3. $2x^2 + x = 15$ [Non-Calculator]
 $x = \frac{-1 \pm \sqrt{1 - 4(2)(-15)}}{4}$
 $= \frac{-1 \pm \sqrt{121}}{4}$
 $= \frac{-1 \pm 11}{4} \rightarrow \frac{10}{4} = \frac{5}{2}$
 $\rightarrow \frac{-12}{4} = -3$

4. $-0.37x^2 + 3.25x + 7.35 = 0$ [Calc]
 $x = \frac{-3.25 \pm \sqrt{3.25^2 - 4(-0.37)(7.35)}}{-0.74}$
 $= \frac{-3.25 \pm \sqrt{21.4405}}{-0.74}$
 $x = -1.87, 10.65$

E. Solve the following using the TI83/84

1. $x^2 + 5x - 10 = 0$

$x = 1.53, -6.53$

2. $\frac{2}{3}x^2 - \frac{4}{7}x - 10 = 0$

$x = -3.47, 4.33$

3. $3x^2 + 15x - 17 = 0$

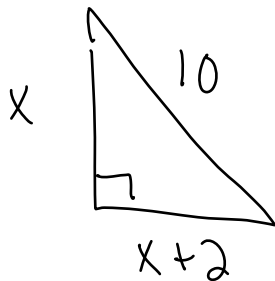
$x = 0.95, -5.95$

4. $0.15x^2 + 7.25x - 13.35 = 0$

$x = 1.78, -50.11$

F. Solving Quadratic Equation Word Problems ReviewI. Rectangles and Right Triangles: Solve the following word problems.

1. The hypotenuse of a right triangle is 10 cm long. If one of the legs is 2 cm longer than the other leg, how long is each leg?



$$x^2 + (x+2)^2 = 100$$

$$x^2 + x^2 + 4x + 4 - 100 = 0$$

$$2x^2 + 4x - 96 = 0$$

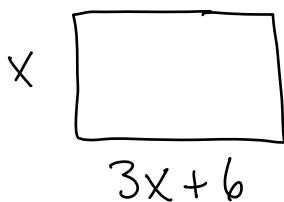
$$x^2 + 2x - 48 = 0$$

$$(x+8)(x-6) = 0$$

$$x = \cancel{-8}, 6$$

Legs are 6 cm
+ 8 cm

2. The length of a rectangle is 6 cm more than triple the width. If the area is 105 cm, find the dimensions of the rectangle.



$$x(3x+6) = 105$$

$$3x^2 + 6x - 105 = 0$$

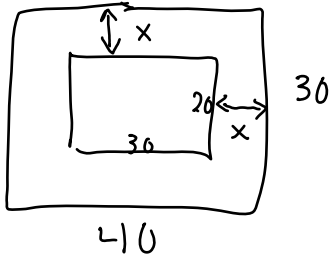
$$x^2 + 2x - 35 = 0$$

$$(x+7)(x-5) = 0$$

$$x = \cancel{-7}, 5$$

5 cm x 21 cm

3. A rectangular piece of land measuring 20 m by 30 m has a uniform sidewalk around it. If the area of the sidewalk is 600 meters squared, what is the outside perimeter of the sidewalk?



$$\begin{aligned}(30 + 2x)(20 + 2x) &= 1200 \\ 600 + 100x + 4x^2 - 1200 &= 0 \\ 4x^2 + 100x - 600 &= 0 \\ x^2 + 25x - 150 &= 0 \\ (x + 30)(x - 5) &= 0\end{aligned}$$

$$x = \cancel{-30}, 5$$

$$P = 140 \text{ m}$$

4. Two consecutive even numbers have a product of 288. Determine the value of the numbers.

$$\begin{aligned}x(x + 2) &= 288 \\ x^2 + 2x - 288 &= 0 \\ (x + 18)(x - 16) &= 0 \\ x &= -18, 16\end{aligned}$$

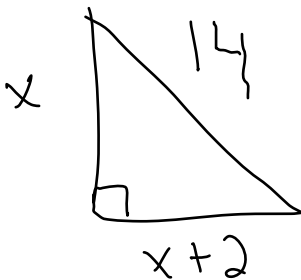
$$\begin{aligned}16 + 18 \\ \text{or} \\ -16 + -18\end{aligned}$$

Answers:

- Therefore the legs measure 6 cm and 8 cm.
- Therefore the dimensions of the rectangle are width = 5 cm and length = 21 cm.
- Therefore the dimensions of the sidewalk are 30 m by 40 m. This yields a perimeter of 140 meters.
- The numbers are 16, 18 and -18, -16

II. Rectangles and Right Triangles: Solve the following word problems by Completing the Square or by using the Quadratic Formula.

1. The hypotenuse of a right triangle is 14 cm long. If one of the legs is 2 cm shorter than the other leg, how long is each leg?



$$\begin{aligned}x^2 + (x + 2)^2 &= 196 \\ x^2 + x^2 + 4x + 4 &= 196\end{aligned}$$

$$2x^2 + 4x - 192 = 0$$

$$x^2 + 2x - 96 = 0$$

$$x^2 + 2x + 1 - 1 - 96 = 0$$

$$(x + 1)^2 = 97$$

$$x + 1 = \pm\sqrt{97}$$

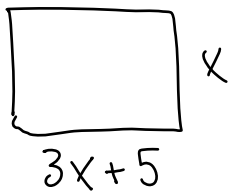
$$x = -1 \pm\sqrt{97}$$

$$x = 8.85$$

$$x = \cancel{-10.85}$$

Legs are 8.85cm
and 10.85cm

2. The length of a rectangle is 5 cm more than triple the width. If the area is 400 cm^2 , find the dimensions of the rectangle.



$$x(3x+5) = 400$$

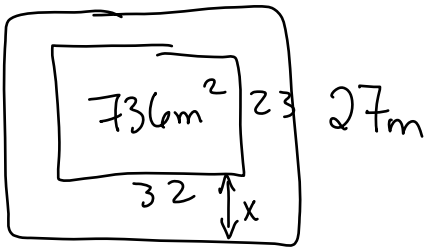
$$3x^2 + 5x - 400 = 0$$

$$x = \frac{-5 \pm \sqrt{25 - 4(3)(-400)}}{6}$$

$$= \frac{-5 \pm \sqrt{4825}}{6} \begin{cases} \rightarrow 10.74 \\ \rightarrow -12.41 \end{cases}$$

Dimensions are
 $10.74 \text{ cm} \times 37.23 \text{ cm}$

3. A rectangular piece of land measuring 23 m by 32 m has a uniform sidewalk around it. If the area of the sidewalk is 236 meters squared, what is the outside perimeter of the sidewalk?



$$(23+2x)(32+2x) = 972$$

$$736 + 110x + 4x^2 = 972$$

$$4x^2 + 110x - 236 = 0$$

$$2x^2 + 55x - 118 = 0$$

$$x = \frac{-55 \pm \sqrt{55^2 - 4(2)(-118)}}{4}$$

$$= \frac{-55 \pm \sqrt{3969}}{4}$$

$$= \frac{-55 \pm 63}{4} \rightarrow 2$$

$$\rightarrow -29.5$$

Perimeter = 126 m

4. Two consecutive even numbers have a product of 168. Determine the value of the numbers.

$$x(x+2) = 168$$

$$x^2 + 2x - 168 = 0$$

$$x^2 + 2x + 1 - 1 - 168 = 0$$

$$(x+1)^2 - 169 = 0$$

$$(x+1)^2 = 169$$

$$x+1 = \pm 13$$

$$x = -1 \pm 13$$

$$x = 12, -14$$

$$12 + 14 \text{ or } -12 + -14$$

Answers:

- Therefore the legs measure 8.85 cm and 10.85 cm.
- Therefore the dimensions of the rectangle are width = 10.74 cm and length = 37.23 cm.
- This yields a perimeter of 126 meters.
- The numbers are 12, 14 and -14, -12.