

SECTIONS 3.4 – 3.7 FACTORING

Complete the following problems from your textbook showing all appropriate work.

Page 160 – 161 # 26, 30, 37, 42, 45, 54

Bonus: Page 161 # 72 – you must show work!

#26 $4n^2+9$

The polynomial is prime.

#30 $6a^3b+4a^2b^2-2a^2bc$

$$6a^3b + 4a^2b^2 - 2a^2bc = 2a^2b \cdot 3a + 2a^2b \cdot 2b - 2a^2b \cdot c = 2a^2b(3a + 2b - c)$$

#37 $20x^2 + 3xy - 2y^2$

$$\begin{aligned} 20x^2 + 3xy - 2y^2 &= 20x^2 - 5xy + 8xy - 2y^2 \\ &= 5x(4x - y) + 2y(4x - y) \\ &= (4x - y)(5x + 2y) \end{aligned}$$

#42 $35x^2 - 11x - 6$

$$\begin{aligned} 35x^2 - 11x - 6 &= 35x^2 + 10x - 21x - 6 \\ &= 5x(7x + 2) - 3(7x + 2) \\ &= (7x + 2)(5x - 3) \end{aligned}$$

#45 $16x^3 + 250$

$$\begin{aligned} 16x^3 + 250 &= 2(8x^3 + 125) = 2((2x)^3 + 5^3) \\ &= 2(2x + 5)((2x)^2 - (2x)5 + 5^2) \\ &= 2(2x + 5)(4x^2 - 10x + 25) \end{aligned}$$

#54 $7n(7n+2)=8$

$$\begin{aligned} 7n(7n + 2) &= 8 \\ 49n^2 + 14n &= 8 \\ 49n^2 + 14n - 8 &= 0 \\ 49n^2 + 28n - 14n - 8 &= 0 \\ 7n(7n + 4) - 2(7n + 4) &= 0 \\ (7n + 4)(7n - 2) &= 0 \end{aligned}$$

$$\begin{array}{lcl}
7n + 4 = 0 & \text{or} & 7n - 2 = 0 \\
7n = -4 & \text{or} & 7n = 2 \\
n = -\frac{4}{7} & \text{or} & n = \frac{2}{7}
\end{array}$$

Answer: The solution set is $\left\{-\frac{4}{7}, \frac{2}{7}\right\}$

#72 The area of triangle is 39 square feet. The length of one side is 1 foot more than twice the altitude to that side. Find the length of that side and the altitude to the side.

Let x be the length of the altitude. Then the length of the base is $2x + 1$. The area of a triangle is

$$Area = \frac{1}{2} \text{base} \times \text{altitude}$$

Then

$$A = \frac{1}{2}(2x+1)x = 39$$

$$\frac{1}{2}(2x+1)x = 39$$

$$(2x+1)x = 78$$

$$2x^2 + x = 78$$

$$2x^2 + x - 78 = 0$$

$$2x^2 - 12x + 13x - 78 = 0$$

$$2x(x-6) + 13(x-6) = 0$$

$$(x-6)(2x+13) = 0$$

$$x-6 = 0 \quad \text{or} \quad 2x+13 = 0$$

$$x = 6 \quad \text{or} \quad 2x = -13$$

$$x = 6 \quad \text{or} \quad x = -\frac{13}{2}$$

The length cannot be negative, so the only solution is $x = 6$. Thus, the altitude is 6 ft and the length of the side is $2(6) + 1 = 13$ ft.

Answer: The length of altitude is 6 ft and the length of the side is 13 ft.