

Chapter 3 Review

Factor
→ tree

p 198 #1a, 2cd, 3a, 6a, 7a, 13 all
19ace, 25ace, 32, 18ace, 24ac
27ad, 28ab, 30, 35, p 201 #7d, e

1a. 594

6×99

$2 \cdot 3 \cdot 9 \cdot 11$

$2 \cdot 3 \cdot 3 \cdot 3 \cdot 11$

$2 \cdot 3^3 \cdot 11$

2c. 176

$4 \cdot 44$

$2 \cdot 2 \cdot 4 \cdot 11$

$2 \cdot 2 \cdot 2 \cdot 2 \cdot 11$

$2^4 \cdot 11$

320

$8 \cdot 40$

$2 \cdot 4 \cdot 4 \cdot 10$

$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5 \cdot 2$

$2^6 \cdot 5$

368

$4 \cdot 92$

$2 \cdot 2 \cdot 4 \cdot 23$

$2 \cdot 2 \cdot 2 \cdot 2 \cdot 23$

$2^4 \cdot 23$

$GCF = 2^4 = 16$

what they have in common

d. $176 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 11$

$320 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5$

$368 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 23$

$2 \cdot 2 \cdot 2 \cdot 2 = 16$

L.C.M. = 16 · 11 · 5 · 23

$$\begin{array}{l}
 2d) \quad 484 \\
 \quad \wedge \\
 \quad 4 \cdot 121 \\
 \quad \wedge \quad \wedge \\
 \quad 2 \cdot 2 \cdot 11 \cdot 11 \\
 \quad 2^2 \cdot 11^2
 \end{array}$$

$$\begin{array}{l}
 496 \\
 \quad \wedge \\
 \quad 16 \cdot 31 \\
 \quad \wedge \\
 \quad 4 \cdot 4 \cdot 31 \\
 \quad \wedge \quad \wedge \quad \wedge \\
 \quad 2 \cdot 2 \cdot 2 \cdot 2 \cdot 31 \\
 \quad 2^4 \cdot 31
 \end{array}$$

$$\begin{array}{l}
 884 \\
 \quad \wedge \\
 \quad 4 \cdot 221 \\
 \quad \wedge \quad \wedge \\
 \quad 2 \cdot 2 \cdot 17 \cdot 13 \\
 \quad 2^2 \cdot 13 \cdot 17
 \end{array}$$

GCF = $2^2 = \boxed{4}$ since they have 2 common

3a) $70, 140, 210, 280, 350, 420, 490, 560, 630, 700, 770, 840, 910, 980, 1050, 1120, 1190, 1260$

OR

$$\begin{array}{l}
 70 \\
 \quad \wedge \\
 \quad 7 \cdot 10 \\
 \quad \wedge \quad \wedge \\
 \quad 7 \cdot 2 \cdot 5 \\
 \quad 2 \cdot 5 \cdot 7
 \end{array}$$

$$\begin{array}{l}
 90 \\
 \quad \wedge \\
 \quad 9 \cdot 10 \\
 \quad \wedge \quad \wedge \\
 \quad 3 \cdot 3 \cdot 2 \cdot 5 \\
 \quad 2 \cdot 3^2 \cdot 5
 \end{array}$$

$$\begin{array}{l}
 140 \\
 \quad \wedge \\
 \quad 14 \cdot 10 \\
 \quad \wedge \quad \wedge \\
 \quad 2 \cdot 7 \cdot 2 \cdot 5 \\
 \quad 2^2 \cdot 5 \cdot 7
 \end{array}$$

LCM - take the greatest power of each prime factor

$$\boxed{2^2 \cdot 3^2 \cdot 5 \cdot 7 = 1260}$$

6a) 784

$$\begin{array}{l}
 \quad \wedge \\
 \quad 4 \cdot 196 \\
 \quad \wedge \quad \wedge \\
 \quad 2 \cdot 2 \cdot 4 \cdot 49 \\
 \quad \wedge \quad \wedge \quad \wedge \\
 \quad 2 \cdot 2 \cdot 2 \cdot 2 \cdot 7 \cdot 7 \\
 \quad (2 \cdot 2 \cdot 7) (2 \cdot 2 \cdot 7)
 \end{array}$$

Square root of 784

$$\begin{array}{l}
 = 2 \cdot 2 \cdot 7 \\
 = \boxed{28}
 \end{array}$$

7a) 1728

8 · 216

4 · 2 · 4 · 54

2 · 2 · 2 · 2 · 2 · 9 · 6

2 · 2 · 2 · 2 · 2 · 3 · 3 · 3 · 2

cube root of 1728

$(2 \cdot 2 \cdot 3) (2 \cdot 2 \cdot 3) (2 \cdot 2 \cdot 3)$

$= \sqrt[3]{1728}$

GCF

3a) $8x^2 - 12x = 4x(2x - 3)$

b) $3y^3 - 12y^2 + 15y = 3y(y^2 - 4y + 5)$

c) $4b^3 - 2b - 6b^2 = 2b(2b^2 - 1 - 3b)$

d) $6m^3 - 12m - 24m^2 = 6m(m^2 - 2 - 4m)$

Short Trinomials

9a) $q^2 + 6q + 8$

$\begin{array}{l|l} P(8) & S(6) \\ 4, 2 & \end{array} \quad (q+4)(q+2)$

c) $54 - 15s + s^2$
 $s^2 - 15s + 54$

$\begin{array}{l|l} P(54) & S(-15) \\ -9, -6 & \end{array} \quad (s-9)(s-6)$
 or

e) $x^2 - x - 20 = (x-5)(x+4)$

$\begin{array}{l|l} P(20) & S(-1) \\ 9, -5 & \end{array} \quad (9-s)(6-s)$

Long Trinomial

25a) $4k^2 - 7k + 3$

- $a \cdot c = 4(3) = 12$

- $\begin{array}{r|l} P(12) & S(-7) \\ -4, -3 & \end{array}$

$$\begin{aligned} 4k^2 - 4k - 3k + 3 \\ (4k^2 - 4k) + (-3k + 3) \\ 4k(k-1) - 3(k-1) \end{aligned}$$

$$\boxed{(4k-3)(k-1)}$$

c) $4b^2 - 5b - 6$

$a \cdot c = 4(-6) = -24$

$\begin{array}{r|l} P(-24) & S(-5) \\ -8, +3 & \end{array}$

$$\begin{aligned} 4b^2 - 8b + 3b - 6 \\ (4b^2 - 8b) + (3b - 6) \\ 4b(b-2) + 3(b-2) \end{aligned}$$

$$\boxed{(4b+3)(b-2)}$$

f) $21x^2 + 8x - 4$

$a \cdot c = (21)(-4) = -84$

$\begin{array}{r|l} P(-84) & S(8) \\ -6, 14 & \end{array}$

$$\begin{aligned} 21x^2 - 6x + 14x - 4 \\ (21x^2 - 6x) + (14x - 4) \\ 3x(7x-2) + 2(7x-2) \end{aligned}$$

$$\boxed{(3x+2)(7x-2)}$$

Difference of Squares

32a) $81 - 4b^2$
 $\boxed{(9-2b)(9+2b)}$

b) $16v^2 - 49$
 $\boxed{(4v-7)(4v+7)}$

c) $64g^2 - 16h^2$
GCF $\sqrt{16}$ $(4g^2 - h^2)$
 $\boxed{16(2g-h)(2g+h)}$

d) $18m^2 - 2n^2$
GCF $\sqrt{2}$ $(9m^2 - n^2)$
 $\boxed{2(3m-n)(3m+n)}$

$$18 \text{ a) } (g+5)(g-4)$$

$$g^2 - 4g + 5g - 20$$

$$\boxed{g^2 + g - 20}$$

$$\text{c) } (k-4)(k+11)$$

$$k^2 + 11k - 4k - 44$$

$$\boxed{k^2 + 7k - 44}$$

$$\text{e) } (12-t)(12-t)$$

$$144 - 12t - 12t + t^2$$

$$\boxed{144 - 24t + t^2}$$

$$\boxed{t^2 - 24t + 144}$$

$$24 \text{ a) } (2r+7)(3r+5)$$

$$6r^2 + 10r + 21r + 35$$

$$\boxed{6r^2 + 31r + 35}$$

$$\text{c) } (2a-7)(2a-6)$$

$$4a^2 - 12a - 14a + 42$$

$$\boxed{4a^2 - 26a + 42}$$

$$27 \text{ a) } (c+1)(c^2+3c+2)$$

$$c^3 + 3c^2 + 2c + c^2 + 3c + 2$$

$$\boxed{c^3 + 4c^2 + 5c + 2}$$

$$\text{d) } (3x^2+7x+2)(2x-3)$$

$$6x^3 - 9x^2 + 14x^2 - 21x + 4x$$

$$\boxed{6x^3 + 5x^2 - 17x - 6}$$

$$28 \text{ a) } (4m-p)^2$$

$$(4m-p)(4m-p)$$

$$16m^2 - 4mp - 4mp + p^2$$

$$\boxed{16m^2 - 8mp + p^2}$$

$$\text{b) } (3g-4h)^2$$

$$(3g-4h)(3g-4h)$$

$$9g^2 - 12gh - 12gh + 16h^2$$

$$\boxed{9g^2 - 24gh + 16h^2}$$

$$30 \text{ a) } (5a+1)(4a+2) + (a-5)(2a-1)$$

$$20a^2 + 10a + 4a + 2 + 2a^2 - a - 10a + 5$$

$$\boxed{22a^2 + 3a + 7}$$

$$\begin{aligned}
 b) & (6c-2)(4c+2) - (c+1)(c-1) \\
 & (6c-2)(4c+2) - (c+1)(c-1) \\
 & 24c^2 + 12c - 4c - 4 - (c^2 + 1c - 1c - 1) \\
 & 24c^2 + 4c - 4 - (c^2 + 1c - 1c - 1) \\
 & 24c^2 + 4c - 4 - c^2 - 1c - 1c - 1 \\
 & 23c^2 - 10c - 5
 \end{aligned}$$

$$\begin{aligned}
 35 & (2x+5)(2x-5) - (x+3)(x+3) \\
 & 4x^2 + 10x + 10x + 25 - (x^2 + 3x + 3x + 9) \\
 & 4x^2 + 20x + 25 - (x^2 + 6x + 9) \\
 & 4x^2 + 20x + 25 - x^2 - 6x - 9 \\
 & \boxed{3x^2 + 14x + 16}
 \end{aligned}$$

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$$\begin{aligned}
 7d) & 4r^2 + 20rs + 25s^2 \\
 a \cdot c & = 4(25) = 100
 \end{aligned}$$

$$\begin{array}{l|l}
 P(100) & S(20) \\
 \hline
 10, 10 &
 \end{array}$$

$$\begin{aligned}
 & 4r^2 + 10rs + 10rs + 25s^2 \\
 & 4r^2 + 10rs + (10rs + 25s^2) \\
 & 2r(2r + 5s) + 5s(2r + 5s)
 \end{aligned}$$

$$\boxed{(2r + 5s)(2r + 5s)}$$

$$\begin{aligned}
 e) & 6x^2 - 17xy + 5y^2 \\
 a \cdot c & = 6(5) = 30
 \end{aligned}$$

$$\begin{array}{l|l}
 P(30) & S(-7) \\
 \hline
 -15, -2 &
 \end{array}$$

$$\begin{aligned}
 & 6x^2 - 15xy - 2xy + 5y^2 \\
 & (6x^2 - 15xy) + (-2xy + 5y^2) \\
 & 3x(2x - 5y) - y(2x + 5y)
 \end{aligned}$$

$$\boxed{(3x - y)(2x - 5y)}$$