

Math 45 6.3 Day 2 - Factoring Trinomials ax^2+bx+c

$$a \neq 1$$

$$a \neq 6CF$$

Quick
Check
6.3.7

Factor completely.

$$90m^2 - 19m - 90$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

☐ A. $90m^2 - 19m - 90 = \square$ (Factor completely.)

☐ B. The polynomial is prime.

factors that give 90

1, 90

2, 45

3, 30

5, 18

6, 15

9, 10

$$(9x - 10)(10x + 9)$$

$$\text{check } -100 + 81 = -19.$$

$$\begin{array}{c} 8100 \\ \times \\ -19 \end{array}$$

$$90m^2 + 81m - 100m - 90$$

$$9m(10m + 9) - 10(10m + 9)$$

$$(10m + 9)(9m - 10)$$

$$1, 8100$$

$$2, 4050$$

$$3, 2700$$

$$4, 2025$$

$$5, 1620$$

$$6, 1350$$

$$8, 1215$$

$$9, 1080$$

$$10, 810$$

$$12, 675$$

$$15, 540$$

$$18, 450$$

$$20, 405$$

$$25, 324$$

$$27, 300$$

$$30, 270$$

$$36, 225$$

$$45, 180$$

$$50, 162$$

$$96 \leftarrow 54, 150$$

$$75 \leftarrow 60, 135$$

$$\begin{array}{c} 81, 100 \\ 90, 90 \end{array}$$

Quick
Check
6.3.15

Factor the trinomial completely using the trial and error method.

$$-14y^2 + 125y + 9$$

$$-14y^2 + 125y + 9 = \square$$

factor out -1 :

$$-(14y^2 - 125y - 9)$$

factors of 14

1, 14

2, 7

factors of 9

1, 9

3, 3

$$(y-9)(14y+1)$$

check $-126 + 1 = -125$ right #, wrong sign

$$\boxed{-(y+9)(14y-1)}$$

$$-(14y^2 - 125y - 9)$$

$$= -[14y^2 - 126y + y - 9]$$

$$= -[14y(y-9) + (y-9)]$$

$$= \boxed{-(y-9)(14y+1)}$$

$$\begin{array}{cc} & -126 \\ -126 & \times & +1 \\ & -125 \end{array}$$

6.3.35

Factor completely.

$$35x^2 - 82x + 48$$

$$35x^2 - 82x + 48 = (7x - 8)(5x - 6)$$

Guess & check

$$(5x \quad)(7x \quad)$$

$$(5x - 8)(7x - 6)$$

check $-30 - 56 \times$

$$(5x - 6)(7x - 8)$$

check $-40 - 42 \checkmark$

$$\begin{array}{r} 1680 \\ \times -82 \\ \hline \end{array}$$

$$\begin{aligned} &35x^2 - 40x - 42x + 48 \\ &= 5x(7x - 8) - 6(7x - 8) \\ &= \boxed{(7x - 8)(5x - 6)} \end{aligned}$$

1, 1680
2, 840
3, 560
4, 420
5, 336
6, 280
7, 240
8, 210
10, 168
12, 140
14, 120
15, 112
16, 105
20, 84
21, 80
24, 70
28, 60
30, 56
35, 48
40, 42

6.3.35

Factor completely.

$$33x^2 - 46x + 16$$

$$33x^2 - 46x + 16 = \boxed{(11x+3)(3x-3)}$$

1, 33
and
1, 16
2, 8
4, 4

$$(11x-4)(3x-4)$$

$$33x^2 - 44x - 12x + 16$$

$$-56x \text{ NO}$$

$$(11x-1)(3x-16)$$

$$-3x - 176x \text{ NO}$$

$$(11x-16)(3x-1)$$

$$-11x - 48x = -59x \text{ NO}$$

$$(33x-4)(x-4)$$

$$-4x - 132x \text{ NO}$$

$$(33x-1)(x-16)$$

$$-x - 528x \text{ NO}$$

$$(33x-16)(x-1)$$

$$-16 - 33 = -49 \text{ NO}$$

$$\boxed{(11x-8)(3x-2)}$$

$$-24x - 22x = -46x$$

$$\begin{array}{r} \cancel{528} \\ \cancel{-46} \end{array}$$

1, 528
2, 264
3, 176
4, 132
6, 88
8, 66
11, 48
12, 44
16, 33
22, 24. ✓

$$33x^2 - 22x - 24x + 16$$

$$11x(3x-2) - 8(3x-2)$$

$$\boxed{(11x-8)(3x-2)}$$

6.3.43

Factor the trinomial completely.

$$84s^2 - 38sr - 70r^2$$

$$84s^2 - 38sr - 70r^2 = \square$$

GCF first

$$= 2(42s^2 - 19sr - 35r^2)$$

Factors
of
42:
1, 42
2, 21
3, 14
6, 7

↳ 1, 35
5, 7 Factors
of 35

Guess and check

$$(6s - 5r)(7s - 7r)$$

has GCF X

$$(6s - 7r)(7s + 5r)$$

$$30rs - 49rs = -19rs \checkmark$$

$$= \boxed{2(6s - 7r)(7s + 5r)}$$

6.3.85

Factor.

$$25c^2 + 29c + 9$$

Select the correct choice below and fill in any answer boxes within your choice.

☐ A. $25c^2 + 29c + 9 = \blacksquare$

☒ B. The expression is prime.

It's prime because $25c^2$ and 9 are perfect squares, but

$$\begin{aligned} & (5c+3)(5c+3) \\ \text{gives } & 25c^2 + 15c + 15c + 9 \\ & = 25c^2 + 30c + 9 \end{aligned}$$

which has the wrong middle term.

M45 55M 2/e 6.3.

Extras (Mixed Factoring Practice) p.1

- ① $30x + 22x^2 - 24x^3$
- ② $48x - 74x^2 + 28x^3$
- ③ $27x^4 + 42x^2 + 16$
- ④ $6x^2(x^2+1) - 25x(x^2+1) + 14(x^2+1)$
- ⑤ $10x^2(x-1) - x(x-1) - 2(x-1)$
- ⑥ $6xy^2 + 3x^3y^2 - 2y - x^2y$
- ⑦ $63y^3 + 60xy^3 + 12x^2y^3$
- ⑧ $2a^2b^2 - ac + 2ab^3 - bc$
- ⑨ $18a^2 + 39ab - 24b^2$
- ⑩ $48xy + 24x^2 - 30y^2$
- ⑪ $-20b^2 + 6a^2 + 7ab$
- ⑫ $ab - bx - ay + xy$
- ⑬ $10x - x^2 + 24$
- ⑭ $k^2 + 2kp - 35p^2$

Chapter 5 Review: Multiply

- ⑮ $(2x+5)(4x^2-10x+25)$
- ⑯ $(2x+5)^3$

Mixed Practice p.2

① $30x + 22x^2 - 24x^3$

$= -24x^3 + 22x^2 + 30x$ standard form

$= -2x(12x^2 - 11x - 15)$ GCF

$= \boxed{-2x(3x - 5)(4x + 3)}$ guess + check

② $48x - 74x^2 + 28x^3$

$= 28x^3 - 74x^2 + 48x$ standard form

$= 2x(14x^2 - 37x + 24)$ GCF

$= \boxed{2x(2x - 3)(7x - 8)}$ guess and check

③ $27x^4 + 42x^2 + 16$

$= \boxed{(9x^2 + 8)(3x^2 + 2)}$ guess and check

④ $6x^2(x^2+1) - 25x(x^2+1) + 14(x^2+1)$

$= (x^2+1)[6x^2 - 25x + 14]$ GCF

$= \boxed{(x^2+1)(3x-2)(2x-7)}$ guess and check

⑤ $10x^2(x-1) - x(x-1) - 2(x-1)$

$= (x-1)[10x^2 - x - 2]$ GCF

$= \boxed{(x-1)(2x-1)(5x+2)}$ guess and check

⑥ $\underbrace{6xy^2 + 3x^3y^2}_{\text{GCF } 3xy^2} - \underbrace{2y - x^2y}_{\text{GCF } -y}$ 4 terms - grouping

$= \underbrace{3xy^2(2+x^2) - y(2+x^2)}_{\text{GCF } (2+x^2)}$

$= (2+x^2)\underbrace{(3xy^2 - y)}_{\text{GCF } y} = \boxed{y(x^2+2)(3xy-1)}$

Mixed Practice p.3

$$\textcircled{7} 63y^3 + 60xy^3 + 12x^2y^3$$

$$= 3y^3(21 + 20x + 12x^2)$$

$$= \boxed{3y^3(12x^2 + 20x + 21)}$$

$$= 3y^3(\quad)$$

$$\text{GCF } 3y^3$$

standard form

$$\begin{array}{r} 252 \\ \times 20 \\ \hline \end{array}$$

$$1, 252$$

$$2, 126$$

$$3, 84$$

$$4, 63$$

$$6, 42$$

$$7, 36$$

$$9, 28$$

$$12, 21$$

$$14, 18$$

nothing adds
to 20.

cannot factor.

$$\textcircled{8} 2a^2b^2 - ac + 2ab^3 - bc$$

$$= 2a^2b^2 + 2ab^3 - ac - bc$$

$$= 2ab^2(a+b) - c(a+b)$$

$$= \boxed{(a+b)(2ab^2 - c)}$$

4 terms - grouping

c terms together

} GCF 3 times

$$\textcircled{9} 18a^2 + 39ab - 24b^2$$

$$= 3(6a^2 + 13ab - 8b^2)$$

$$= 3(6a^2 - 3ab + 16ab - 8b^2)$$

$$= 3[3a(2a-b) + 8b(2a-b)]$$

$$= 3(2a-b)[3a+8b]$$

$$= \boxed{3(2a-b)(3a+8b)}$$

$$\text{GCF}$$

$$\begin{array}{r} -48 \\ \times -3 \\ \hline 136 \end{array}$$

$$-1, 48$$

$$-2, 24$$

$$-3, 16$$

$$-4, 12$$

$$-6, 8$$

$$\textcircled{10} 48xy + 24x^2 - 30y^2$$

$$= 24x^2 + 48xy - 30y^2$$

$$= 3(8x^2 + 16xy - 10y^2)$$

$$= 6(4x^2 + 8xy - 5y^2)$$

$$= \boxed{6(2x-y)(2x+5y)}$$

standard form using x.

common factor 3

oops! another common factor 2.

guess and check

$$\begin{aligned}
 (11) \quad & -20b^2 + 6a^2 + 7ab \\
 & = 6a^2 + 7ab - 20b^2 \\
 & = \underbrace{6a^2 - 8ab}_{2a} + \underbrace{15ab - 20b^2}_{5b}
 \end{aligned}$$

$$= 2a(3a-4b) + 5b(3a-4b)$$

$$= \boxed{(3a-4b)(2a+5b)}$$

standard form (using a)

$$\begin{array}{r}
 -120 \\
 -8 \quad \times \quad 15 \\
 7
 \end{array}$$

$$\begin{aligned}
 & -1, 120 \\
 & -2, 60 \\
 & -3, 40 \\
 & -4, 30 \\
 & -5, 24 \\
 & -6, 20 \\
 & -8, 15
 \end{aligned}$$

$$(12) \quad ab - bx - ay + xy$$

$$= b(a-x) - y(a-x)$$

$$= \boxed{(a-x)(b-y)}$$

4 terms $\Rightarrow$ grouping

$$(13) \quad 10x - x^2 + 24$$

$$= -x^2 + 10x + 24$$

$$= -(x^2 - 10x - 24)$$

$$= \boxed{-(x+2)(x-12)}$$

standard form

$$\begin{array}{r}
 -24 \\
 2 \quad \times \quad -12 \\
 -10
 \end{array}$$

$$\begin{aligned}
 & +1, -24 \\
 & \boxed{2, -12} \\
 & 3, -8 \\
 & 4, -6
 \end{aligned}$$

$$(14) \quad k^2 + 2kp - 35p^2$$

$$= \boxed{(k-5p)(k+7p)}$$

$$\begin{array}{r}
 -35 \\
 -5 \quad \times \quad 7 \\
 2
 \end{array}$$

$$\begin{aligned}
 & -1, 35 \\
 & -5, 7
 \end{aligned}$$

$$(15) \quad (2x+5)(4x^2-10x+25)$$

$$\begin{aligned}
 & = 8x^3 - 20x^2 + 50x \\
 & \quad + 20x^2 - 50x + 125
 \end{aligned}$$

$$= \boxed{8x^3 + 125}$$

$$(16) \quad (2x+5)^3$$

$$= (2x+5)(2x+5)(2x+5)$$

$$= (4x^2 + 20x + 25)(2x+5)$$

$$= 8x^3 + 20x^2 + 40x^2 + 100x + 50x + 125$$

$$= \boxed{8x^3 + 60x^2 + 150x + 125}$$