

ANAT 099 S.S.6 #s 1, 5, 7, 8, 17, 21, 24, 27, 37, 38, 51, 52

#s 1-34 FACTOR EACH TRINOMIAL

① $x^2 + 9x + 18$ $18 = (6)(3)$ & $6 + 3 = 9$
 $= x^2 + 6x + 3x + 18$
 $= x(x+6) + 3(x+6)$
 $= (x+6)(x+3)$

⑤ $x^2 + 10x - 24$ $-24 = (-6)(4)$ $-6 + 4 = -2$
 $= x^2 + 12x - 2x - 24$ $= (-12)(2)$ $-12 + 2 = -10$
 $= x(x+12) - 2(x+12)$ $= (12)(-2)$ $12 - 2 = +10$
 $= (x+12)(x-2)$

Aha!

⑤ Alternate Method
 $x^2 + 12x + 2x - 24$, etc.

⑦ $x^2 - 2x - 24$ $10 = -1 + 11$ $-1 + 11 = 10$
 $= x^2 - 6x + 4x - 24$ $= -2 + 12$ $-2 + 12 = 10$
 $= x(x-6) + 4(x-6)$ Aha!
 $= (x-6)(x+4)$

⑧ $x^2 - 9x - 36$ $-36 = (-12)(3)$ $-12 + 3 = -9$
 $= x^2 - 12x + 3x - 36$
 $= x(x-12) + 3(x-12)$
 $= (x-12)(x+3)$

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(13) $2x^2 - 24x - 64$
 $= 2(x^2 - 12x - 32)$

Doesn't factor any further!

We'll see quick way to check for this, later.

$-32 = (-32)(1)$
 $= (-16)(2)$
 $= (-8)(4)$

(17) $2x^2 - 11x + 12$
 $= 2x^2 - 3x - 8x + 12$
 $= x(2x - 3) - 4(2x - 3)$
 $= (2x - 3)(x - 4)$

(2)(12) = 24 Looking for -11?
 $24 = (1)(24)$ 25
 $= (-2)(-12)$ -14
 $= (-3)(-8)$ -11 Yes!

(21) $4x^2 - 12x + 9$
 $= 4x^2 - 6x - 6x + 9$
 $= 2x(2x - 3) - 3(2x - 3)$
 $= (2x - 3)(2x - 3) = (2x - 3)^2$

Product: Sum:
 want -12?
 $(4)(9) = 36$
 $36 = (-4)(-9)$ -13
 Yes! $= (-6)(-6)$ -12

(24) $12y^2 - 48y + 45$
 $= 3(4y^2 - 16y + 15)$
 $= 3[4y^2 - 10y - 6y + 15]$
 $= 3[2y(2y - 5) - 3(2y - 5)]$
 $= 3[(2y - 5)(2y - 3)]$

want -16
 $(15)(4) = 60$
 $(60)(1)$ 61
 $(-60)(-1)$ -61
 $(-30)(-2)$ -32
 $(-15)(-4)$ -19
 Yes! $(-10)(-6)$ -16

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(17) $2x^2 - 11x + 12 =$

$$2x^2 - 8x - 3x + 12$$

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

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

$(12)(2) = (2)(2)(3)(2)$

want sum of -11

$(-3)(-8) = 24$

$(-3)(-8) = -11$ Yes

Alternate:

$-11 = -1 - 10$

$(-1)(-10) = 10$

$= -2 - 9$

$(-2)(-9) = 18$

$= (-3)(-8)$

$(-3)(-8) = 24$

Yes!

(21) $4x^2 - 12x + 9$

$$= 4x^2 - 6x - 6x + 9$$

$$= 2x(2x-3) - 3(2x-3)$$

$$= (2x-3)(2x-3)$$

$$= (2x-3)^2$$

$(4)(9) = 36$, FACTORS of 36

whose sum is -12.

$(-6)(-6)$ does it.

(24) $12y^2 - 48y + 45$

$$= 12y^2 - 18y - 30y + 45$$

$$= 6y(2y-3) - 15(2y-3)$$

$$= (2y-3)(6y-15)$$

oops! Should have factored out a '3' in the very first step!

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

$(12)(45) = 540$ MAGIC!

$-48 = -1 - 47$
HIGHER

$(-1)(-47) = 47$

$= -10 - 38$
HIGHER

$(-10)(-38) = 380$

$= -20 - 28$
LOWER

$(-20)(-28) = 560$

$= -15 - 33$
HIGHER

$(-15)(-33) = 495$

$= -18 - 30$

$(-18)(-30) = 540$

Yes!

(27) $6x^3 + 8x^2 + 24x$

$$= \boxed{2x[3x^2 + 4x + 12]}$$

IS PRIME polynomial

want factors of $(12)(3) = 36$ that add up to 4. IMPOSSIBLE!

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(37) $(5x+1)^2 + 8(5x+1) + 7$

Let $u = 5x+1$. Then we have

$$u^2 + 8u + 7$$

FACTORS OF 7 whose sum is 8: 7, 1

$$= u^2 + 7u + 1u + 7$$

$$= u(u+7) + 1(u+7)$$

$$= (u+7)(u+1) \quad \text{Now re-substitute:}$$

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

$$= \boxed{(5x+8)(5x+2)}$$

(38) $(3x-1)^2 + 5(3x-1) + 6$

Let $u = 3x-1$. we have

$$u^2 + 5u + 6$$

$$= u^2 + 3u + 2u + 6$$

$$= u(u+3) + 2(u+3)$$

$$= (u+3)(u+2)$$

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

$$= (3x+2)(3x+1)$$

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(51) $8x^2 - 26x + 15$

$$= 8x^2 - 6x - 20x + 15$$

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

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

$$(8)(15) = 120$$

$$-26 = -1 - 25 \quad (-25)(-1) = 25$$

HIGHER

$$= -10 - 16 \quad 160$$

LOWER

$$= -5 - 21 \quad 105$$

HIGHER

$$= -8 - 18 \quad 144$$

LOWER

$$= -6 - 20 \quad 120 \quad \checkmark$$

(52) $12x^2 - 17x + 6$

$$= 12x^2 - 9x - 8x + 6$$

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

$$= \boxed{(4x-3)(3x-2)}$$

$$(12)(6) = 72$$

$$72 = (9)(8) = (-9)(-8)$$

$$-9 - 8 = -17$$