Worksheet 6

①

① $70 = 2 \cdot 7 \cdot 5$

$126 = 2 \cdot 3 \cdot 3 \cdot 7$

$42 = 2 \cdot 3 \cdot 7$

$56 = 2 \cdot 2 \cdot 2 \cdot 7$

$GCF = 2 \cdot 7 = \boxed{14}$

$70 = 14 \cdot 5$

$126 = 14 \cdot 9$

$42 = 14 \cdot 3$

$56 = 14 \cdot 4$

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② $84 = 2 \cdot 2 \cdot 3 \cdot 7$

$280 = 2 \cdot 2 \cdot 2 \cdot 5 \cdot 7$

$112 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 7$

$GCF = 2 \cdot 2 \cdot 7 = \boxed{28}$

$84 = 28 \cdot 3$

$280 = 28 \cdot 10$

$112 = 28 \cdot 4$

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③ $y^7 z^2$

$y^4 z^8$

z^3

$GCF = \boxed{z^2}$

$y^7 z^2 = z^2 \cdot y^7$

$y^4 z^8 = z^2 (y^4 z^6)$

$z^3 = z^2 (z)$

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④ $45a^7y^4 = 3 \cdot 3 \cdot 5\, a^7 y^4$

$75a^3y^2 = 3 \cdot 5 \cdot 5\, a^3 y^2$

$90a^2y = 2 \cdot 3 \cdot 3 \cdot 5 a^2 y$

$30a^4y^3 = 2 \cdot 3 \cdot 5 a^4 y^3$

$GCF = 3 \cdot 5 \cdot a^2 \cdot y = \boxed{15a^2y}$

$45a^7y^4 = 15a^2y \cdot (3a^5y^3)$

$75a^3y^2 = 15a^2y(5y)$

$90a^2y = 15a^2y(6)$

$30a^4y^3 = 15a^2y(2a^2y^2)$

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⑤ $84 = \boxed{4(21)}$

⑥ $-75a^4y^2 = 25a^3y^2(-3a)$

⑦ Find GCF

$45xy = 3 \cdot 3 \cdot 5xy$

$18x = 3 \cdot 3 \cdot 2x$

$27x^3y = 3 \cdot 3 \cdot 3x^3y$

$GCF = 3 \cdot 3x = 9x$

$\boxed{9x[5y + 2 + 3x^2y]}$

⑧ Find GCF

$56x^2y^4 = 2 \cdot 2 \cdot 2 \cdot 7x^2y^4$

$-24xy^3 = -2 \cdot 2 \cdot 2 \cdot 3xy^3$

$32xy^2 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2xy^2$

$GCF = 2 \cdot 2 \cdot 2xy^2 = 8xy^2$

$56x^2y^4 - 24xy^3 + 32xy^2$

$= \boxed{8xy^2[7xy^2 - 3y + 4]}$

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⑨ $\underbrace{x^4 + 2x^2}_{\text{group 1}} + \underbrace{5x^2 + 10}_{\text{group 2}}$

x^4, $2x^2$ } $GCF = x^2$ $5x^2$, $2 \cdot 5$ } $GCF = 5$

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

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

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⑩ $\underbrace{12x^2 + 4xy}_{\text{group 1}} \underbrace{-6xy - 2y^2}_{\text{group 2}}$

$12x^2$, $4xy$ } $GCF = 4x$ $-6xy$, $-2y^2$ } $-2y$

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

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

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⑪ Factors of 28

2, 14 -2, -14

4, 7 -4, -7

The ~~pairs~~ pair that sums to -11

$\boxed{-4, -7}$

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⑫ Factors of -54

-2, 27 2, -27

-3, 18 3, -18

-6, 9 6, -9

The pair that sums to -3

$\boxed{6, -9}$

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⑬ Need to pick a number so

$4 \cdot (\ ) = -28$

$4 + (\ ) = -11$

→ -7

$x^2 + 3x - 28 = \boxed{(x-4)(x-7)}$

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⑭ $x^2 - x - 30 = (x+5)(\ \ )$

find number so $5(\ ) = -30$

$5 + (\ ) = -1$

→ -6

$x^2 - x - 30 = \boxed{(x+5)(x-6)}$

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⑮ $x^2 - 11x + 28$

Factors of 28: 4, 7 -4, -7

2, 14 -2, -14

The pair that sum to -11 : $\boxed{-4, -7}$

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⑯ $x^2 - 8x - 33$

factors of -33 : -1, 33 -33, 1

the pair that sum to -8 : None

the polynomial is $\boxed{\text{prime}}$

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⑰ $3p^6 + 18p^5 + 24p^4$

Find a GCF if any

$3p^6 = 3p^6$

$18p^5 = 2 \cdot 3 \cdot 3p^5$

$24p^4 = 2 \cdot 2 \cdot 2 \cdot 3p^4$ } $GCF = 3p^4$

$3p^6 + 18p^5 + 24p^4 = 3p^4(p^2 + 6p + 8)$

→ we can try to factor the quadratic &

factors of 8 : 2, 4 ✓ ~~-2, -4~~

(only need positive factors b/c b=6 is positive)

$3p^4(p^2 + 6p + 8) = \boxed{3p^4(p+4)(p+2)}$

Worksheet 6

⑱ $3 \cdot x y^2 - 24xy + 36x$

Find GCF if any

$$\left.\begin{aligned} 3xy^2 &= 3xy^2 \\ -24xy &= -2\cdot2\cdot2\cdot3xy \\ 36x &= 2\cdot2\cdot3\cdot3x \end{aligned}\right\} 3x$$

$3x(y^2 - 8y + 12)$

Check if quadratic is factorable

negative factors of 12:

$-2, -6$

$-3, -4$

The pair that sum to -8

$-2, -6$

$\boxed{3x(y-2)(y-6)}$

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⑲ $3x^2 + 13x + 14$

step 1 $3 \cdot 14 = 42$

step 2 factors of 42 that are positive

$2, 21$

$3, 14$

$6, 7$ ← these sum to 13

Step 3 : $13x = 6x + 7x$

$\underbrace{3x^2 + 6x}_{\text{group 1}} \quad \underbrace{+7x + 14}_{\text{group 2}}$

$= 3x(x+2) + 7(x+2)$

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

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⑳ $25a^2 + 30ab + 9b^2$

$a \cdot c = 25 \cdot 9 = 225$

→ two factors of 225 that add to 30

→ 15, 15

$30ab = 15ab + 15ab$

$25a^2 + 15ab + 15ab + 9b^2$

$= 5a(5a+3b) + 3b(5a+3b)$

$= (5a+3b)(5a+3b)$

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

㉑ $6x^2 + 19x + 10 = (3x+2)(\quad)$

$6 \cdot 10 = 60$

→ use 4, 15 → $4 + 15 = 19$

$4 \cdot 15 = 60$

→ $19x = 4x + 15x$

$6x^2 + 4x + 15x + 10$

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

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

㉒ $24y^2 - 17y + 3 = (3y-1)(\quad)$

→ $a \cdot c = 24 \cdot 3 = 72$

→ factors of 72 whose sum is -17: $-9, -8$

→ $-17y = -8y - 9y$

$24y^2 - 8y - 9y + 3$

$= 8y(3y-1) - 3(3y-1)$

$= \boxed{(3y-1)(8y-3)}$

Worksheet 6

㉓ $4y^2+3y-10$

I'm going to use grouping method

→ $4\cdot(-10) = -40$

→ factors : $-5, 8$

$3y = 8y + (-5)y$

$4y^2 + 8y - 5y - 10$

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

$= \boxed{(y+2)(4y-5)}$

㉔ $14b^2+3b-2$

→ $a\cdot c = 14(-2) = -28$

→ factors: $7, -4$

$3b = 7b + (-4b)$

$14b^2 + 7b - 4b - 2$

$= 7b(2b+1) + (-2)(2b+1)$

$= \boxed{(2b+1)(7b-2)}$

㉕ A difference of squares:

$(x^2-49) = (x+7)(x-7)$

or factors of -49

$-7, 7$

sum is 0

$0x = 7x - 7x$

$x^2 + 7x - 7x - 49 = x(x+7) + (-7)(x+7)$

㉖ $100r^2 - 9s^2 = (10r-3s)(10r+3s)$

or $100(-9) = -900$

→ Two factors whose sum is 0 : $30, -30$

$100r^2 + 30rs - 30rs - 9s^2$

$= 10r(10r+3s) + (-3s)(10r+3s)$

$= \boxed{(10r+3s)(10r-3s)}$

㉗ $m^2 - 8m + 16$

factors of 16 whose sum is -8 : $-4, -4$

$-8m = -4m + -4m$

$m^2 - 4m - 4m + 16 = m(m-4) + (-4)(m-4)$

$= (m-4)(m-4) = \boxed{(m-4)^2}$

㉘ $-16x^2 - 48x - 36$

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

$(4)(9) = 36$ → factors $6, 6$

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

$= -4[2x(2x+3) + 3(2x+3)]$

$= -4[(2x+3)(2x+3)] = \boxed{-4(2x+3)^2}$

㉙ $b^3 - 27$

use the special form

$= \boxed{(b-3)(b^2+3b+9)}$

㉚ $c^3 - 8 = \boxed{(c-2)(c^2+2c+4)}$

㉛ $m^3 + 64 = (m+4)(m^2-4m+16)$

㉜ $y^3 + 27 = (y+3)(y^2-3y+9)$

Worksheet 6

(33) $2x^2-3x-20=0$

factor

→ $2(-20) = -40$

→ factors $-8, 5$

$-3x = -8x+5x$

$2x^2-8x+5x-20$

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

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

$(x-4)(2x+5)=0$

$x-4=0$ $2x+5=0$

$\boxed{x=4}$ $2x=-5$

$\boxed{x=-5/2}$

(34) $12x^2+7x-12=0$

→ $12(-12) = -144$

→ ~~$9, 16$~~

$-9, 16$

$7x = -9x+16x$

$12x^2-9x+16x-12=0$

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

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

$4x-3=0$ $3x+4=0$

$4x=3$ $3x=-4$

$\boxed{x=3/4}$ $\boxed{x=-4/3}$

(35) $x(2x^2-7x-15)=0$

factor $2x^2-7x-15$

$2(-15) = -30$

→ $-10, 3$

$2x^2-10x+3x-15$

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

$= \cancel{x}(x-5)(2x+3)$

→ $x(x-5)(2x+3)=0$

$\boxed{x=0}$ $x-5=0$ $2x+3=0$

$\boxed{x=5}$ $2x=-3$

$\boxed{x=-\frac{3}{2}}$

(36) $x^3+2x^2-8x=0$

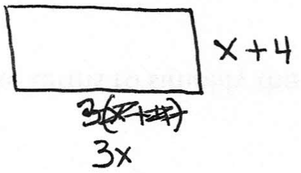
$x(x^2+2x-8)=0$

$x(x+4)(x-2)=0$

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

→ $\boxed{x=0 \quad x=-4 \quad x=2}$

(37) x = original width



$3x(x+4) = 231$

$3x^2+12x-231=0$

$3(x^2+4x-77)=0$

factors of -77 that add to 4

$-7, 11$

$x^2+11x-7x-77$

$=(x)(x+11)+(-7)(x+11)$

$=(x+11)(x-77)$

→ $3(x+11)(x-7)=0$

$(x+11)(x-7)=0$

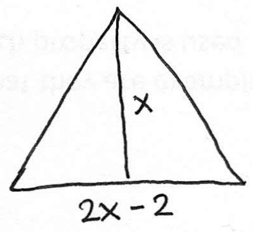
$(x+11)=0$ $x-7=0$

$\boxed{x=-11}$ $\boxed{x=7}$

width can't be neg.

$\boxed{\begin{array}{l}\text{width} = 7\\ \text{length} = 3(7)=21\end{array}}$

x = height of triangle



$42 = \frac{1}{2}x(2x-2)$

$0 = \frac{1}{2}[2x^2-2x]-42$

~~$0 = 2(x^2-x-21)$~~

$0 = x^2-x-42$

$0 = (x-7)(x+6)$

$x-7=0$ $x+6=0$

$x=7$ $x=-6$

height must be positive

$\boxed{x=7}$ height

$2(7)-2 = \boxed{12}$ base.

Worksheet 6

㊴ Two consecutive even integers x, x+2

$x(x+2) = 24 + 3(x+2)$

$x^2+2x = 24+3x+6$

$x^2+2x-3x-30=0$

$x^2-x-30=0$

$(x-6)(x+5)=0$

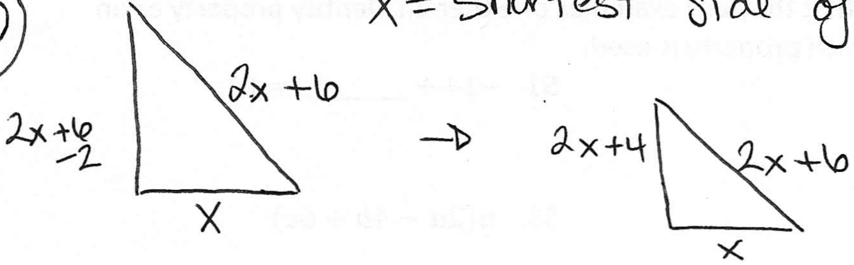
$x-6=0 \quad x+5=0$

$x=6 \quad x=-5$

we want even integers

$\boxed{\begin{array}{c} x=6 \\ x+2=8 \end{array}}$

㊵ X = shortest side of triangle



Use pythagorean theorem

$a^2+b^2=c^2$

$(2x+4)^2+(x)^2=(2x+6)^2$

$4x^2+16x+16+x^2=4x^2+24x+36$

$5x^2-4x^2+16x-24x+16-36=0$

$x^2-8x-20=0$

$(x-10)(x+2)=0$

$x-10=0 \quad x+2=0$

$\boxed{x=10} \quad \boxed{x=-2}$

length should be positive

short ~~side~~ leg: $x=10$

long leg: $2x+4=24$

hypotenuse: $2x+6=26$

-20

$\to -10, 2$

$x^2+2x-10x-20$

$=x(x+2)+(-10)(x+2)$

$=(x+2)(x-10)$