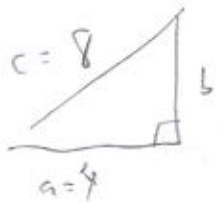
Final Geometry 2022

1. (10 pts)



$a^2 + b^2 = c^2$ 3

$4^2 + b^2 = 8^2$ 3

$16 + b^2 = 64$ 2

$b^2 = 48$

$b = \sqrt{48} = \sqrt{16 \cdot 3} = \sqrt{16} \cdot \sqrt{3} = \boxed{4\sqrt{3}}$ 2

10 2. Mathematics is the art and science of discovering and using patterns.

10 3. a) $\mathbb{N}, \mathbb{Z}, \mathbb{Q}, \mathbb{R}$ 2 each

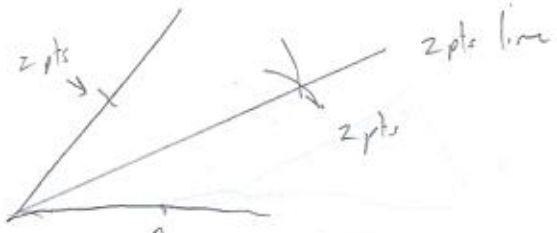
b) $\mathbb{R}$

c) $\mathbb{Z}, \mathbb{Q}, \mathbb{R}$

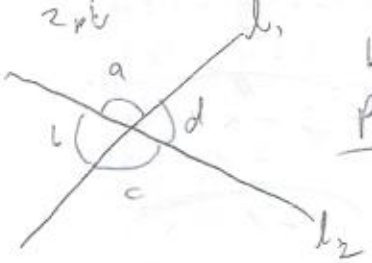
d) $\mathbb{Q}, \mathbb{R}$

e) $\mathbb{Q}, \mathbb{R}$

8 4.



12 pts 5.



We must show $m\angle a = m\angle c$

Pf: $m\angle a + m\angle b = 180$ because l_1 is a line 4

$m\angle c + m\angle b = 180$ because l_2 is a line 4

$m\angle a - m\angle c = 0$

$+m\angle c \quad +m\angle c$

$m\angle a = m\angle c$ □ 4

10 pts 9. c) $f(3) = 2(3) - 5 = 1$

b) $g(-2) = (-2)^3 - 2(-2)^2 - 2 + 3 = -8 - 8 - 2 + 3 = -15$

5 pts 10. $A = \frac{1}{2} \cdot 7 \cdot 12 = 42$

10 pts 11. $d(X,Y) = \sqrt{3^2 + 4^2}$

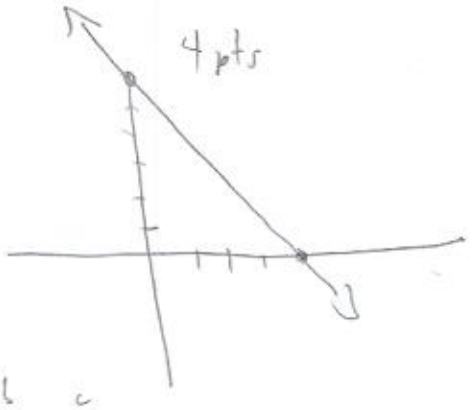
$d(Z,Y) = \sqrt{3^2 + 4^2}$

$d(X,Z) = \sqrt{7^2 + 7^2}$

X, Z equidistant to Y

X, Y, not equidistant to Z

10 12.



4 pts

$3x + 2y = 12$

x-int $3x + 2 \cdot 0 = 12$

$x = 4$ 3 pts

y-int $3 \cdot 0 + 2y = 12$

$y = 6$ 3 pts

10 13. $1x^2 + 1x + 1 = 0$ (a, b, c)

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-1 \pm \sqrt{1 - 4}}{2} = \frac{-1 \pm \sqrt{-3}}{2} = \frac{-1 \pm \sqrt{3}\,i}{2}$

3 pts, 3 pts, 2 pts, 2 pts

10 pts 14. $3x + 2y = 12$

$\frac{2y}{2} = \frac{-3x + 12}{2}$ 3 pts

$y = -\frac{3}{2}x + 6$ 3 pts

$m = -3/2$ 2 pts

$m_\perp = 2/3$ 2 pts

12 pts 15. a) $\Delta HGF \sim \Delta HTS$ 4

b/c AA

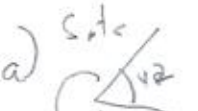
b) $\Delta CBA \sim \Delta FGH$ 4

b/c it is scaled by a factor of 6.

c) $\Delta STU \sim$ Nothing 4

b/c angles are different

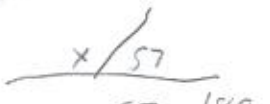
10 pts 16. a) S.t.c



$x + 42 = 360$

$x = 318$

5 pts b)

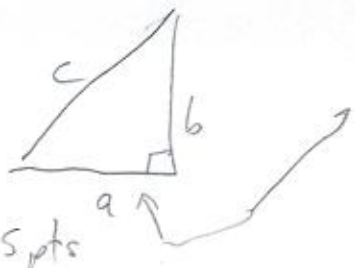


$x + 57 = 180$

$-57 \quad -57$

$x = 123$

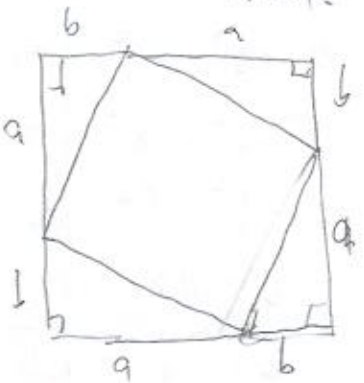
6. 15



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

5 pts

Proof:



5 pts

$(a+b)^2 = 4(\frac{1}{2}ab) + c^2$ 3

$a^2+2ab+b^2 = 2ab+c^2$ 1

$-2ab \quad -2ab$

$a^2+b^2=c^2$ ☐ 1

7. Pf: 10

$m\angle a + m\angle x = 90$ 3

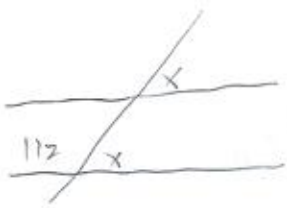
$-\ m\angle b + m\angle x = 90$ 3

$m\angle a - m\angle b = 0$ 2

$+m\angle b \quad +m\angle b$ 2

$m\angle a = m\angle b$

8. a) 10 pts



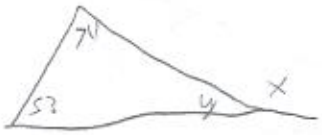
$x+112=180$

$-112 \quad -112$

$x = 68$

5 pts

b)



$74+53+y=180$

$-\quad x+y=180$

$74+53-x=0$

$+x \quad +x$

$127 = x$

5 pts