Geometry H
Unit 4 Review

Name : Key
Date : _____ Period : _____

Solve the following proportions :

1. $\frac{11}{26}=\frac{x}{15}$

$166 = 26x \Rightarrow \boxed{x = 6.3}$

2. $\frac{5}{x-1}=\frac{7}{x}$

$5x = 7(x-1)$

$5x = 7x - 7 \Rightarrow -2x = -7 \Rightarrow \boxed{x = 3.5}$

3. $\frac{y}{2y+3}=\frac{y-8}{y-3}$

$y(y-3) = (2y+3)(y-8)$

$y^2 - 3y = 2y^2 - 16y + 3y - 24$

$y^2 - 3y = 2y^2 - 13y - 24$

$0 = y^2 - 10y - 24$

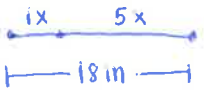
$0 = (y-12)(y+2)$

$\boxed{y = 12,\ y = -2}$

4. Please find the geometric mean of 8 and 30 in simplest radical form.

$\sqrt{8 \cdot 30} = \sqrt{240} = \sqrt{16}\sqrt{15} = \boxed{4\sqrt{15}}$

5. A board that is 18 inches long is cut into two pieces in the ratio 1 : 5. Find the length of each piece.



piece + piece = whole

$1x + 5x = 18$

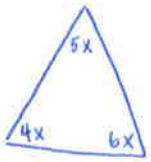
$6x = 18$

$\boxed{x = 3}$

$1(3) = 3$ in

$5(3) = 15$ in

6. The measures of the angles of a triangle are in the extended ratio of 4: 5: 6. Find the measures of the angles in the triangle.



$4x + 5x + 6x = 180$

$15x = 180$

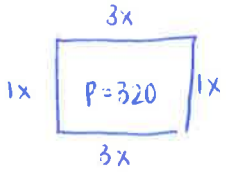
$\boxed{x = 12}$

Angles: $4(12) = 48°$

$5(12) = 60°$

$6(12) = 72°$

7. A rectangular region of land has a perimeter of 320 feet and the ratio of its length to width is 3 : 1. Find the length and the width of the region of land.



$3x + 1x + 3x + 1x = 320$

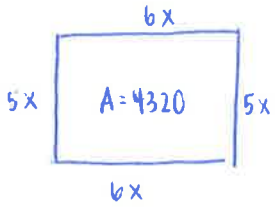
$8x = 320$

$\boxed{x = 40}$

length $= 3(40) = 120$ ft

width $= 1(40) = 40$ ft

8. The area of a rectangle is 4320 square inches. The ratio of the width to the length is 5:6. Find the length and the width.



Area = length x width

$4320 = (6x)(5x)$

$4320 = 30x^2$

$144 = x^2$

$\boxed{x = 12}$

Length $= 6(12) = 72$ in

Width $= 5(12) = 60$ in

9. A map has a scale of 0.5 inch : 10 miles. If the actual distance between the two cities is 340 miles, how far apart are they on the map?

$\frac{\text{map}}{\text{actual}}: \frac{0.5 \text{ in}}{10 \text{ mi}} = \frac{x}{340 \text{ mi}} \Rightarrow 10x = 170$

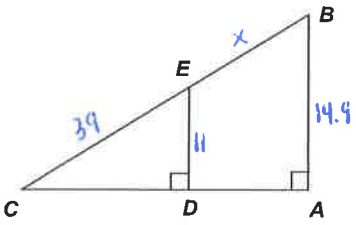
$x = 17$

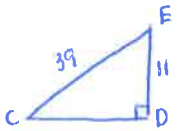
The cities are 17 in apart on the map

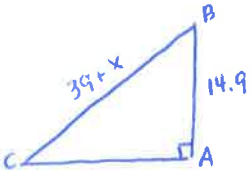
10. If two polygons are similar, then the corresponding angles must be Congruent.

11. If two polygons are similar, then the corresponding sides must be proportional.

12. In the diagram, $\triangle ECD \sim \triangle BCA$. CE = 39, ED = 11, and AB = 14.9. Please solve for BC to the nearest tenth.







$\frac{39}{39+x} = \frac{11}{14.9}$

$11(39+x) = 581.1$

$429 + 11x = 581.1$

$11x = 162.1$

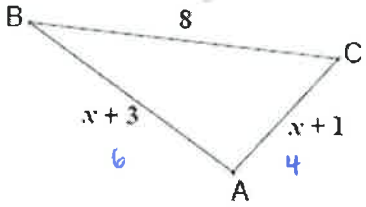
$x = 13.8$

$BC = 39 + x$

$BC = 39 + 13.8$

$\boxed{BC = 52.8}$

13. The side lengths of $\triangle ABC$ are related like this: AB:BC:AC with an extended ratio of 3:4:2. Please find the length of each side.



$\frac{AB}{BC} = \frac{3}{4} \Rightarrow \frac{x+3}{8} = \frac{3}{4}$

$24 = 4(x+3)$

$24 = 4x + 12$

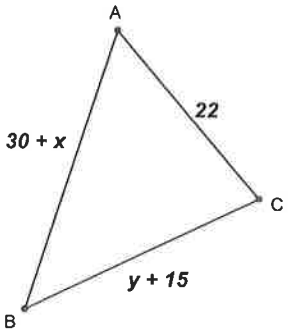
$12 = 4x$

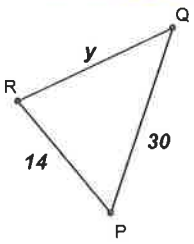
$\boxed{x = 3}$

$\boxed{\begin{array}{l} AB = 6 \\ AC = 4 \\ BC = 8 \end{array}}$

14. Solve for x and y, given that $\triangle ABC \sim \triangle PQR$. Round your answers to nearest tenth if necessary.

← use order of the letters to match up corresponding sides





$\frac{AB}{PQ} = \frac{BC}{QR} \Rightarrow \frac{30+x}{30} = \frac{y+15}{y} \Rightarrow \frac{47.1}{30} = \frac{y+15}{y} \Rightarrow 47.1y = 30(y+15)$

$47.1y = 30y + 450$

$17.1y = 450$

$\boxed{y = 26.3}$

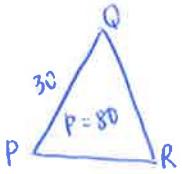
$\frac{AB}{PQ} = \frac{AC}{PR} \Rightarrow \frac{30+x}{30} = \frac{22}{14} \Rightarrow 14(30+x) = 660$

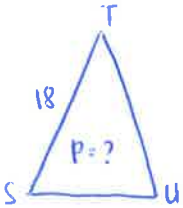
$420 + 14x = 660$

$14x = 240$

$\boxed{x = 17.1}$

15. The perimeter of ΔPQR is 80, PQ = 30 and ST = 18. If $\Delta PQR \sim \Delta STU$, what is the perimeter of ΔSTU?





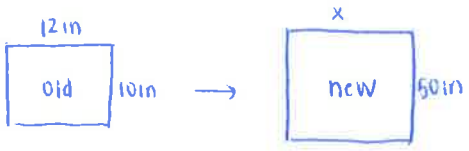
$\frac{\Delta PQR}{\Delta STU} : \frac{30}{18} = \frac{80}{x}$

$30x = 1440$

$x = 48$

The perimeter of ΔSTU is 48 units

16. A photo needs to be enlarged from an original with a length of 12 inches and a width of 10 inches to a size where the new width is 50 inches. What is the new length? What is the scale factor?



$\frac{12}{x} = \frac{10}{50}$

$10x = 600$

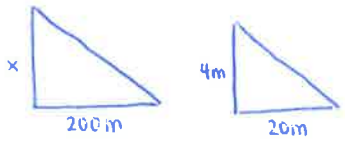
$x = 60$

Length: 60 in

Scale factor = $\frac{\text{new}}{\text{old}}$ $= \frac{50}{10} = 5$

$k = 5$

17. A building casts a shadow 200 meters long. At the same time, a pole 4 meters high casts a shadow 20 meters long. What is the height of the building?

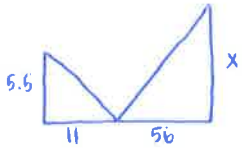


$\frac{x}{4} = \frac{200}{20} \Rightarrow 20x = 800$

$x = 40$

The building is 40m tall

18. Marcia wants to measure the height of the flagpole at her school. She places a mirror on the ground 56 feet from the flagpole, then walks backward until she is able to see the top of the flagpole in the mirror. Her eyes are 5.5 feet above the ground, and she is 11 feet from the mirror. What is the height of the flagpole to the nearest tenth of a foot?

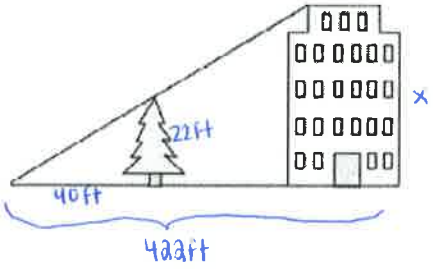


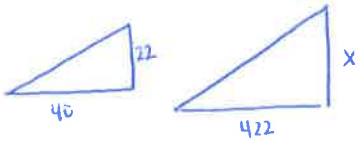
$\frac{x}{5.5} = \frac{56}{11} \Rightarrow 11x = 308$

$x = 28$

The flagpole is 28 feet tall

19. Melody wants to find the height of the tallest building in the city. She stands 422 feet away from the building. There is a tree 40 feet in front of her, which she knows is 22 feet tall. How tall is the building to the nearest foot?





$\frac{22}{x} = \frac{40}{422}$

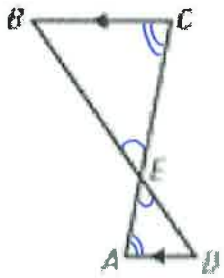
$40x = 9284$

$x = 232.1$

The building is about 232 ft tall

For Questions 20 – 23, determine whether the triangles are similar. If they are, give a reason why and write a similarity statement.

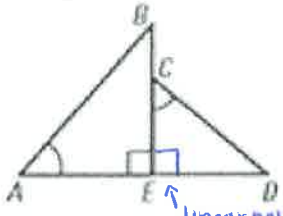
20.



$\angle BEC \cong \angle DEA$ by vertical angles and $\angle B \cong \angle D$ OR $\angle A \cong \angle C$ by alt. interior angles

So $\triangle BEC \sim \triangle DEA$ by AA~

21.

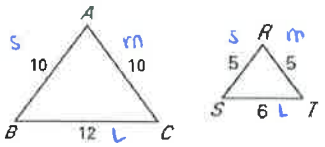


linear pair so $m\angle CED = 90°$

$\angle A \cong \angle C$ and $\angle BEA \cong \angle DEC$

So $\triangle AEB \sim \triangle CED$ by AA~

22.



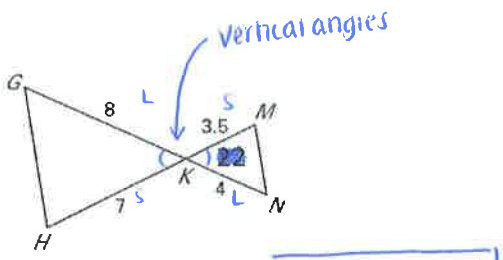
$\frac{\triangle ABC}{\triangle RST}$: $\frac{10}{5}$: $\frac{10}{5}$: $\frac{12}{6}$

$\downarrow$ $\downarrow$ $\downarrow$

$\frac{2}{1}$: $\frac{2}{1}$: $\frac{2}{1}$

$\triangle ABC \sim \triangle RST$ by SSS$\sim$

23.



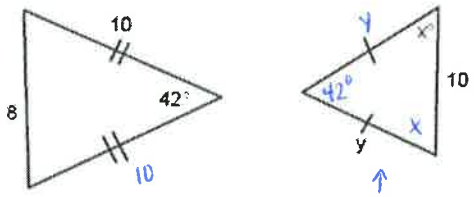
$\frac{\triangle GKH}{\triangle MKN}$: $\frac{7}{3.5}$: $\frac{8}{4}$

$\downarrow$ $\downarrow$

$\frac{2}{1}$: $\frac{2}{1}$

$\triangle GKH \sim \triangle MKN$ by SAS$\sim$

24. The two triangles are similar. Please find the values of x and y. (Diagram not drawn to scale).



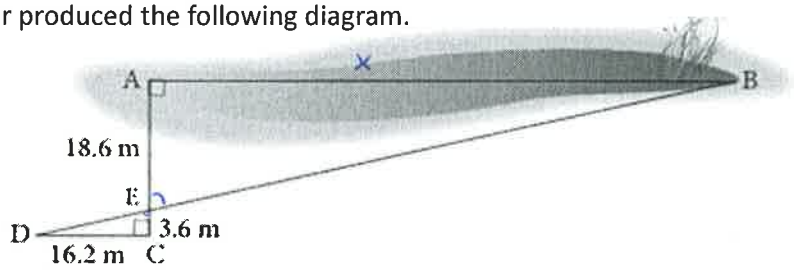
$\frac{\text{left}}{\text{right}}$: $\frac{10}{y} = \frac{8}{10} \Rightarrow 8y = 100$

$y = 12.5$

$42 + 2x = 180$

$2x = 138 \Rightarrow$ $x = 69$

25. To calculate the length of a marsh, a surveyor produced the following diagram.



a) Please write a similarity statement and explain why the triangles are similar.

$\angle A \cong \angle C$ and $\angle AEB \cong \angle CED$ by VAT

So $\triangle AEB \sim \triangle CED$ by AA$\sim$

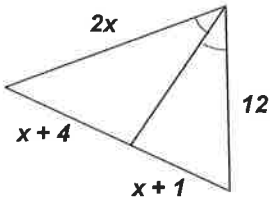
b) Please find the length of the marsh to the nearest tenth of a unit.

$\frac{x}{16.2} = \frac{18.6}{3.6} \Rightarrow$ $3.6x = 301.32$

$x = 83.7$

The marsh is 83.7 m long

26. Please find the value of x.



$\frac{x+4}{x+1} = \frac{2x}{12} \Rightarrow$

$12(x+4) = 2x(x+1)$

$12x + 48 = 2x^2 + 2x$

$0 = 2x^2 - 10x - 48$

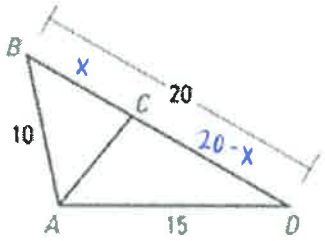
$\frac{0}{2} = \frac{2(x^2 - 5x - 24)}{2}$

$0 = x^2 - 5x - 24$

$0 = (x-8)(x+3)$

$x = 8$, $x \neq -3$ ← no negative side lengths in a triangle

27. Given that $\angle BAC \cong \angle DAC$, please find BC.



$\frac{x}{20-x} = \frac{10}{15}$

$15x = 10(20 - x)$

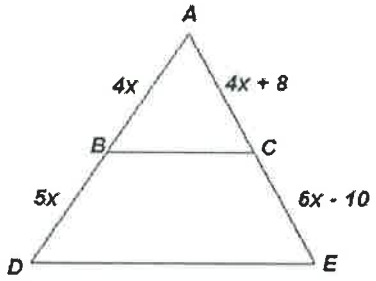
$15x = 200 - 10x$

$25x = 200$

$x = 8$

$BC = 8$ units

28. Please find CE so that $\overline{BC} \parallel \overline{DE}$.



$\frac{4x}{5x} = \frac{4x+8}{6x-10} \Rightarrow 4x(6x-10) = 5x(4x+8)$

$24x^2 - 40x = 20x^2 + 40x$

$4x^2 - 80x = 0$

$4x(x-20) = 0$

$4x = 0 \quad x - 20 = 0$

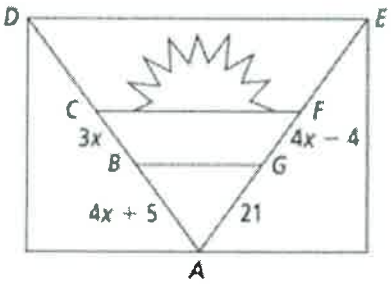
$x \neq 0 \quad x = 20$

↑ no zero side lengths

$CE = 6(20) - 10$

$CE = 110$ units

29. An artist made a sketch of the flag of Antigua and Barbuda for a mural. In the image, $\overline{BG} \parallel \overline{CF}$. The measures indicate the length of the lines in feet. What is the value of x?



$\frac{21}{4x-4} = \frac{4x+5}{3x} \Rightarrow 3x(21) = (4x-4)(4x+5)$

$63x = 16x^2 + 20x - 16x - 20$

$63x = 16x^2 + 4x - 20$

$0 = 16x^2 - 59x - 20$

$0 = 16x^2 - 64x + 5x - 20$

$0 = 16x(x-4) + 5(x-4)$

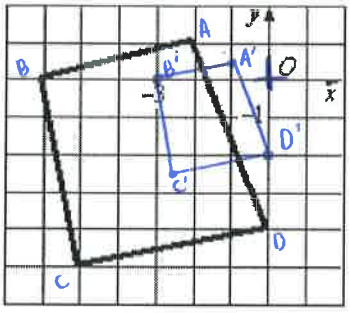
$0 = (16x+5)(x-4)$

$x = -5/16$, $x = 4$

↑ can't have negative side lengths

Draw the image of the given figure after a dilation with center (0 , 0) and the given scale factor.

30. Scale factor : $\frac{1}{2}$



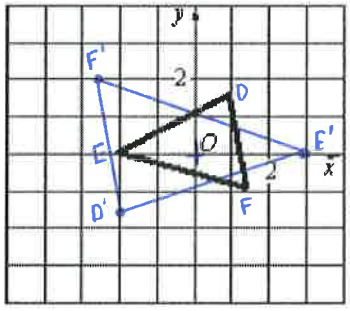
$A(-2,1) \times \frac{1}{2}$ $A'(-1, 0.5)$

$B(-6,0) \times \frac{1}{2}$ $B'(-3, 0)$

$C(-5,-5) \times \frac{1}{2}$ $C'(-2.5, -2.5)$

$D(0,-4) \times \frac{1}{2}$ $D'(0, -2)$

31. Scale factor : -2



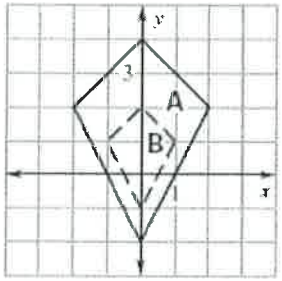
$D(1, 1.5) \times -2$ $D'(-2, -3)$

$E(-2,0) \times -2 \Rightarrow E'(4, 0)$

$F(1.5,-1) \times -2$ $F'(-3, 2)$

Determine whether the dilation from Figure A to Figure B is a *reduction* or an *enlargement*. Then find its scale factor. old new

32.

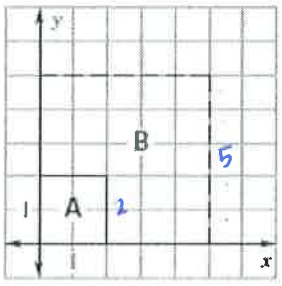


Reduction

$k = \frac{\text{new}}{\text{old}} = \frac{(1,1)}{(2,2)} = \frac{1}{2}$

$k = 1/2$

33.



enlargement

$k = \frac{\text{new}}{\text{old}} = \frac{5}{2}$

$k = 5/2$

34. The table below shows the coordinated of ΔRST and the coordinates of R' in ΔR'S'T' under a dilation centered at the origin.

Triangle RST (old)		Triangle R'S'T' (new)	
R	(–2, –3)	R'	(–6, –9)
S	(0, 2)	S'	(0, 6)
T	(2, –3)	T'	(6, –9)

$\frac{\text{new}}{\text{old}} = \frac{(-6,-9)}{(-2,-3)} = \frac{-6}{-2} = 3$

$k = 3$

What are the coordinates of S' and T'? Explain how you determined your answer.

To find the scale factor, I put new coordinates R' over old coordinates R, then I divided their x-values $\frac{-6}{-2}$ to get a k=3. I then multiplied the coordinates of S and T by 3 to get S' and T'.

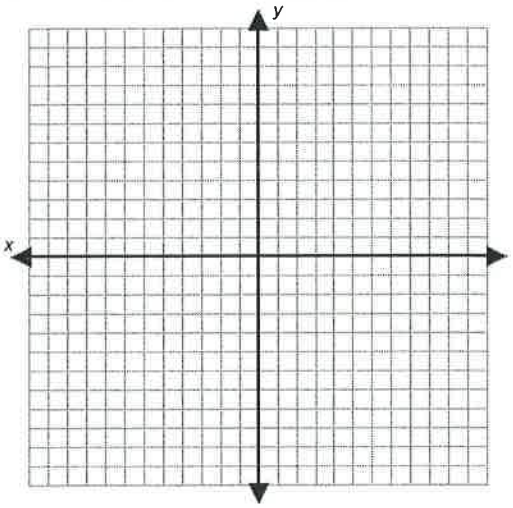
35. ΔABC has vertices A(1, 2), B(2, 3) and C(3, 1). ΔABC is dilated by a scale factor of 3 and dilated again by a scale factor of ½. The resulting image is ΔA'B'C'. What are the coordinates of the vertices for ΔA'B'C'?

$A(1,2) \xrightarrow{\times 3} A'(3,6) \xrightarrow{\times \frac{1}{2}} A'(1.5, 2)$

$B(2,3) \xrightarrow{\times 3} B'(6,9) \xrightarrow{\times \frac{1}{2}} B'(3, 4.5)$

$C(3,1) \xrightarrow{\times 3} C'(9,3) \xrightarrow{\times \frac{1}{2}} C'(4.5, 1.5)$

36. ΔABC has vertices A(4, 2), B(4, 6) and C(7, 2). Find the vertices that represent a dilation of ΔABC centered at (4, 0) with a scale factor of 2.



A: From center (4,0) to A(4,2): $(x+0, y+2) \times 2$

$(x+0, y+4)$

From (4,0): $(4+0, 0+4) \Rightarrow A'(4,4)$

B: From center (4,0) to B(4,6): $(x+0, y+6) \times 2$

$(x+0, y+12)$

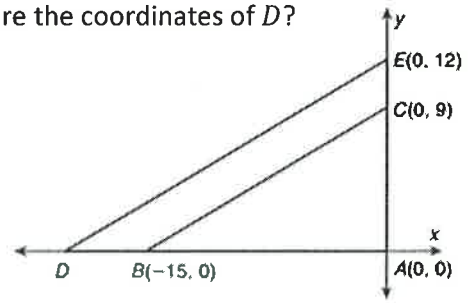
From (4,0): $(4+0, 0+12) \Rightarrow B'(4,12)$

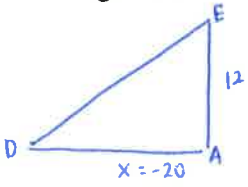
C: From center (4,0) to C(7,2): $(x+3, y+2) \times 2$

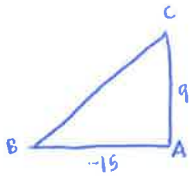
$(x+6, y+4)$

From (4,0): $(4+6, 0+4) \Rightarrow C'(10,4)$

37. ΔEAD is the dilation image of ΔCAB about the origin. Find the scale factor for the dilation. What are the coordinates of D?







$\frac{12}{9} = \frac{x}{-15}$

$9x = -180$

$x = -20$

$D(-20, 0)$

ANSWER KEY :

1) 6.3 2) $\frac{7}{2}$ 3) y = -2 or y = 12 4) $4\sqrt{15}$ 5) 3in, 15in

6) $48^\circ, 60^\circ, 72^\circ$ 7) 40ft, 120ft 8) 72 in. and 60 in. 9) 17 inches 10) Congruent

11) Proportional 12) 52.8 13) 6, 8, 4 14) $x \approx 17.1$, y = 26.25

15) 48 units 16) 60 in, Scale factor 5 : 1 17) 40m

18) 28 ft 19) 232 ft 20) $\Delta ECB \sim \Delta EAD$, AA ~ 21) $\Delta AEB \sim CED$, AA ~

22) $\Delta BAC \sim \Delta SRT$, SSS~ 23) $\Delta HKG \sim \Delta MKN$, SAS~ 24) x = 69°, y = 12.5

25) a) $\Delta CED \sim \Delta AEB$ by AA~ since the right angles are congruent and Vertical angles are congruent.
b) 83.7 m

26) 8 27) 8 units 28) 110 29) 4

30) New Coordinates : (-3, 0) (-1, 0.5) (0, -2) (-2.5, -2.5)

31) New Coordinates : (4, 0) (-2, -3) (-3, 2) 32) Reduction, scale factor : $\frac{1}{2}$

33) Enlargement, scale factor : 2.5 34) S' (0, 6), T' (6, -9), Scale factor is 3

35) A'(3/2, 3), B'(3, 9/2), C'(9/2, 3/2) 36) A'(4, 4), B'(4, 12), C'(10, 4)

37) k = 4/3; D(-20, 0)