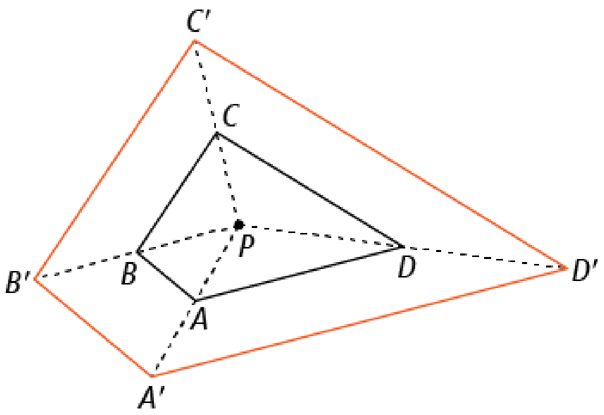
16.



17. The side lengths of the image are half the side lengths of the preimage. To find the scale factor, take the ratio of the side lengths in the image to the corresponding side lengths in the preimage.

$\frac{Q'R'}{QR} = \frac{2}{4} = \frac{1}{2}$ or $\frac{R'S'}{RS} = \frac{1}{2}$

18. $\frac{2}{3}$; The scale factor is equal to the ratio of the side lengths in the image to the corresponding side lengths in the preimage.

$\frac{A'B'}{AB} = \frac{2}{3}$

19. $A'\,(3, 0)$, $B'\,(12, -6)$, $C'\,(6, -9)$, $D'\,(-7.5, -15)$

Preimage Point	Distance from (0, 0)		1.5 Times Distance from (0, 0)		Add to (0, 0)	Image Point
	Horizontal	Vertical	Horizontal	Vertical		
$A\,(2, 0)$	2	0	3	0	$(0 + 3, 0 + 0)$	$A'\,(3, 0)$
$B\,(8, -4)$	8	-4	12	-6	$(0 + 12, 0 - 6)$	$B'\,(12, -6)$
$C\,(4, -6)$	4	-6	6	-9	$(0 + 6, 0 - 9)$	$C'\,(6, -9)$
$D\,(-5, -10)$	-5	-10	-7.5	-15	$(0 - 7.5, 0 - 15)$	$D'\,(-7.5, -15)$

20. $X'(1,1)$, $Y'(3,3)$, $Z'(5,-1)$

Preimage Point	Distance from $X(1, 1)$		Double-Distance from $X(1, 1)$		Add to $X(1, 1)$	Image Point
	Horizontal	Vertical	Horizontal	Vertical		
$X(1,1)$	0	0	0	0	$(1+0, 1+0)$	$X'(1,1)$
$Y(2,2)$	1	1	2	2	$(1+2, 1+2)$	$Y'(3,3)$
$Z(3,0)$	2	-1	4	-2	$(1+4, 1-2)$	$Z'(5,-1)$

21. $A = 13$; To find the area of the preimage, divide the image by the square of the scale factor.

$$A \cdot k^2 = A'$$
$$A = \frac{A'}{k^2}$$
$$A = \frac{(832)}{\left(8^2\right)}$$
$$A = 13$$

22. $x = 6$, $y = 15$; The length of a side of the image is the product of the length of the corresponding side of the preimage times the scale factor. Solve for x and y.

$$FH \cdot 3 = F'H'$$
$$(2x - 3)\,3 = 4x + 3$$
$$6x - 9 = 4x + 3$$
$$2x = 12$$
$$x = 6$$

$$FG \cdot 3 = F'G'$$
$$(x - 1)\,3 = y$$
$$((6) - 1)\,3 = y$$
$$15 = y$$

23. $(-1, 3)$; To find the coordinates of the center of dilation, first find the scale factor. The scale factor is equal to the ratio of the side lengths in the image to the corresponding side lengths in the preimage.

$$\frac{D'E'}{DE} = \frac{2}{1} = 2$$

Since the scale factor is 2, every image point is twice as far from the center of dilation as its preimage point. Therefore, the distance between E and E' is the same as the distance between E and the center of dilation. The distance between E and E' is 3, and $2 - 3 = -1$, so the x-coordinate is -1. E and E' have no change in y-value, so the center of dilation lies on the same line and has a y-coordinate of 3.

24. **a.** No; the lengths are not proportional; $\frac{8}{2} \neq \frac{10}{3}$.

b. By multiplying by a scale factor of 4, he can enlarge the image to 8 in. by 12 in. and then crop 2 in. from the length.