Connecting Mathematics in Strand 2 - Student Activity 2

Below are two similar triangles.

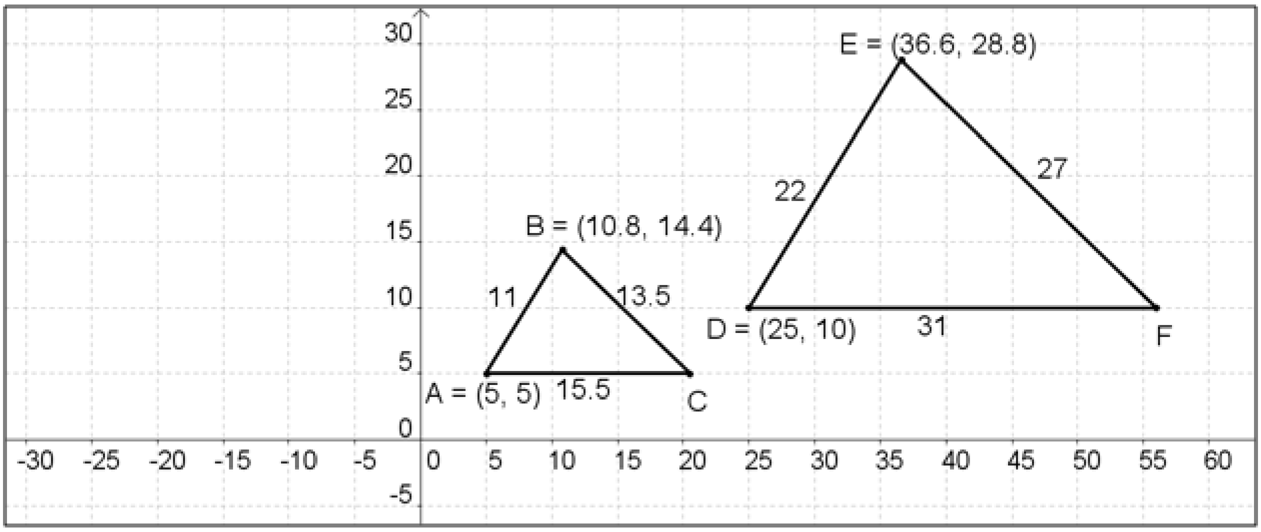


Fig. 6.1

(i) *A* and *B* are the points (5, 5) and (10.8, 14.4) as shown. $|AC|$ is 15.5 cm.

Name the co-ordinates of *C*.

Answer: *C* (,)

(ii) Using the length formula, verify that $|AC|$ is 15.5 cm.

(iii) *D* and *E* are the points (25, 10) and (36.6, 28.8) as shown. $|DF|$ is 31 cm.

Name the co-ordinates of F.

Answer: *F* (,)

(iv) Show using figure 6.1 that the scale factor, k, is 2.

(v) How would you describe the image that is formed?

Explain your answer by referring to the scale factor, k.

(vi) Using the information on figure 6.1 find the perpendicular height of each triangle from their horizontal base.

$\triangle ABC$ Perpendicular height = $\boxed{}$ $\triangle DEF$ Perpendicular height= $\boxed{}$

What do you notice?

(vii) By using a ruler/straight edge, find the centre of enlargement, P, on figure 6.1 page 10. Show construction rays. Name the coordinates of the point P.

Answer: $\boxed{P\ (\qquad,\qquad)}$

(viii) By using an alternative method to the one above, find the coordinates of the centre of enlargement.

Would it be possible to **always** use this alternative method for finding the centre of enlargement? Explain.

(ix) Find $|\angle ACB|$ using trigonometry.

(x) Is there an angle bigger than $|\angle ACB|$ in $\triangle ABC$? Give a reason for your answer.

(The use of protractors is not allowed.)

(xi) Write, in the space provided, different formulae for finding the area of a triangle.

Formula 1:

Formula 2:

Formula 3:

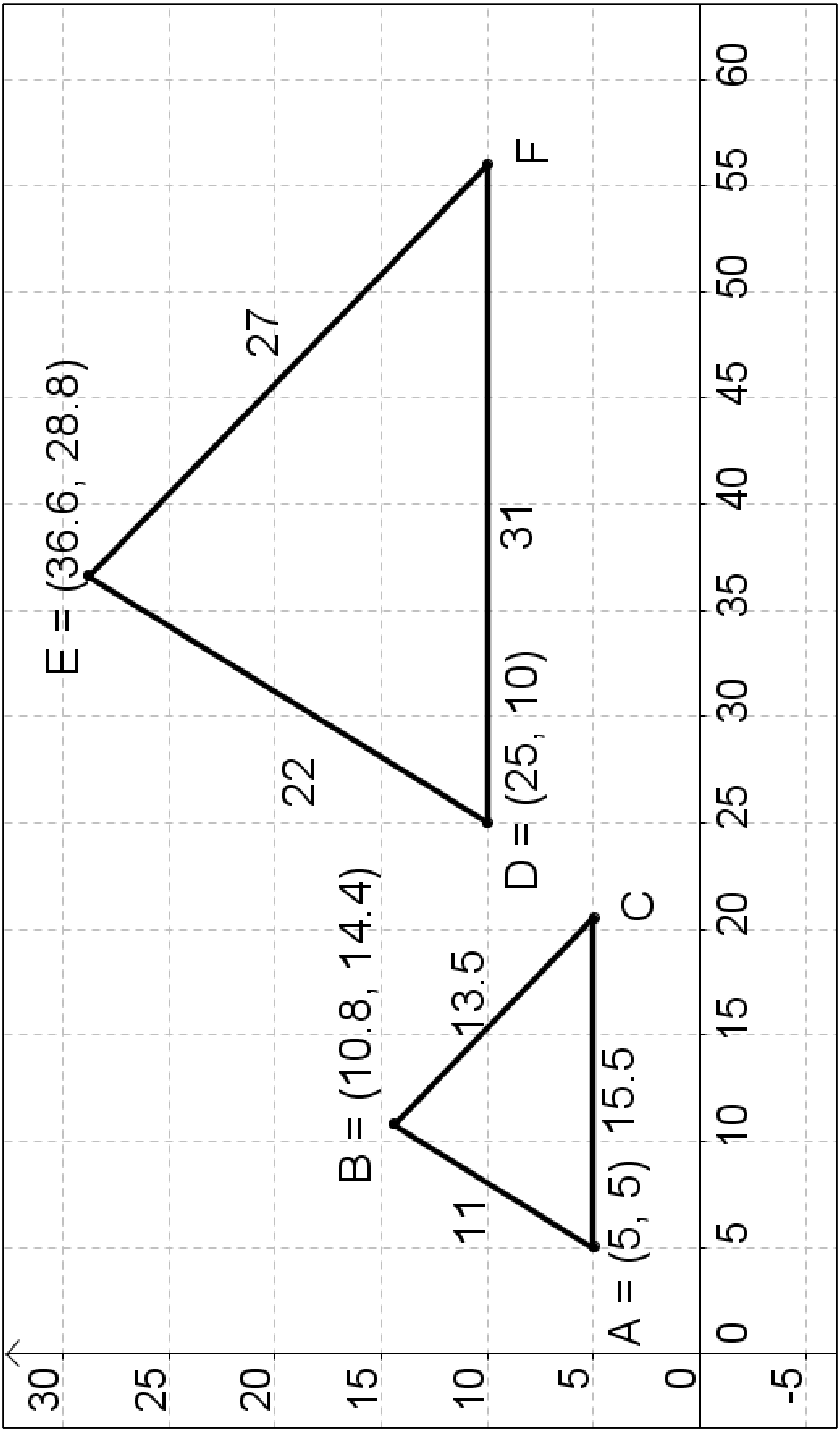
(xii) Find the area of $\triangle ABC$ using formula 1.

(xiii) Find the area of $\triangle ABC$ by using formula 2.

(xiv) Find the area of $\triangle ABC$ by using formula 3.

(xv) Find the area of $\triangle DEF$.

(xvi) Using the diagram below construct the centroid (S) of $\triangle ABC$ and construct the centroid (T) of $\triangle DEF$.



(xvii) The centroid of a triangle can be calculated using the following formula:

$$\left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right).$$

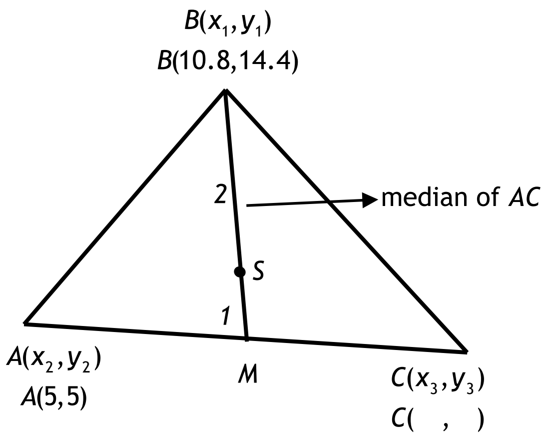
Calculate the centroid for each triangle, correct to 1 d.p.

Centroid of $\triangle ABC$: $\boxed{S(\quad , \quad)}$ Centroid of $\triangle DEF$: $\boxed{T(\quad , \quad)}$

(xviii) If 2 triangles are similar, then the ratio of 2 corresponding lengths is equal to the scale factor. Show that this statement is true by calculating $|AS|$ and $|DT|$, correct to 1 d.p.

(xix) A special property of the centroid of a triangle is that it will **always** divide each median into two segments whose lengths are in the ratio 2:1, with the longest segment nearest the vertex.

Note: The median of a triangle is a line joining a vertex to the midpoint of the opposing line.



Show that the special property mentioned above is true for the median [BM] in $\triangle ABC$.

(xx) ***LC(HL)** Verify, using the above property, that the centroid of a triangle formula is as follows:

$$\left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

(xxi) ***LC (HL)** Show that point A (5, 5) divides $[PD]$ internally in the ratio 1:1.

Do you notice any other points dividing a line segment in the ratio 1:1?
If so, name them.