UNIT 9 *Areas and Perimeters* Activities

Activities

ACTIVITY 9.1 *Areas of Hands*

You will need Activity 9.1a Resource Sheet

1. Ted has drawn round his hand on squared paper – see Activity 9.1a Resource Sheet. Find the area inside the outline by counting the squares.

   Do all the people in your class get the same answer?

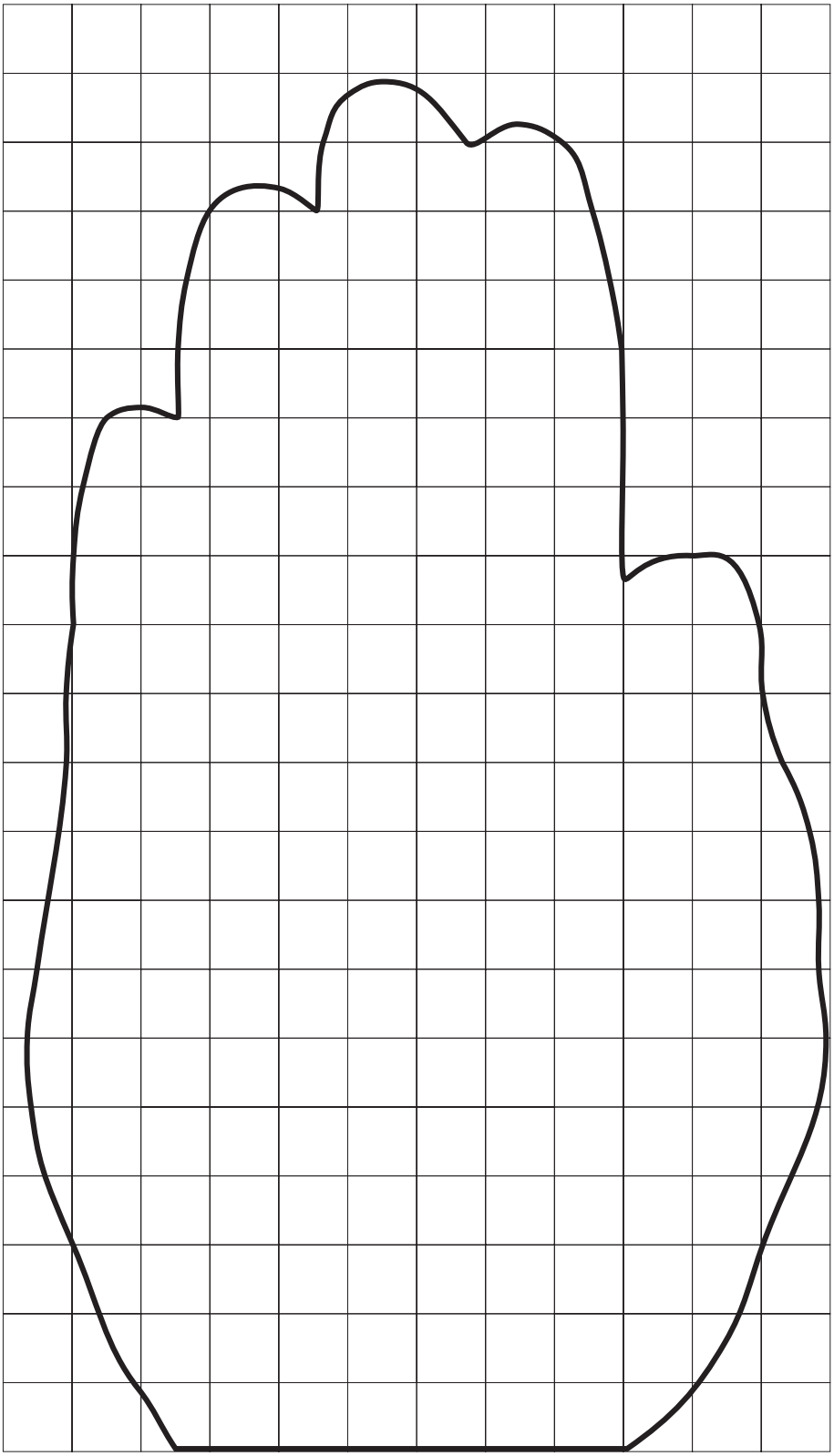
2. Draw round *your* hand and find the area.

3. Answer the following questions.
   (a) Who has the biggest hand in your class?
   (b) Who has the smallest hand in your class?
   (c) Is anyone's hand as big as Ted's?
   (d) Are boys' hands bigger than girls' hands?

4. (a) Find the areas of your brothers', sisters' or friends' hands.
   (b) Draw a scatter plot to show *area of hand* against *age*.
   (c) Describe any trends.

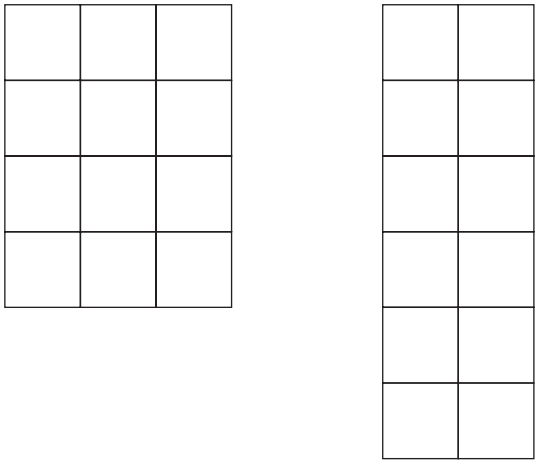
ACTIVITY 9.1a Resource Sheet

Outline of Ted's hand



ACTIVITY 9.2 *Area and Perimeter of Rectangles*

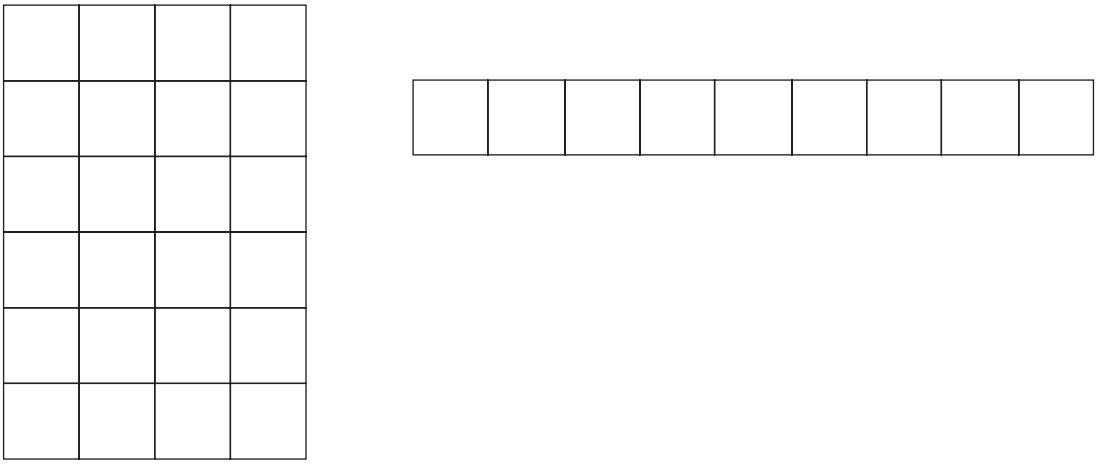
A. What is the area of each of these two rectangles?



Construct other rectangles with the same area as those above.

Do all these rectangles have perimeters of the same length?

B. What is the perimeter of each of these two rectangles?



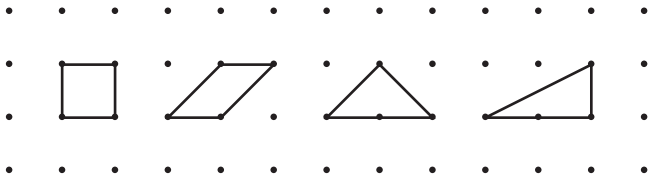
Construct other rectangles with perimeters of the same length as those above.

Do all these rectangles have the same area?

ACTIVITY 9.3 *Areas and Points*

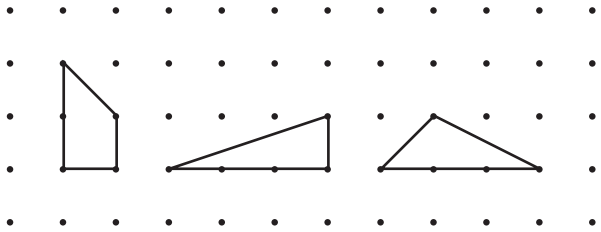
1. These shapes are each made by joining four points, with no points inside the shapes.

   Find the area of each shape.

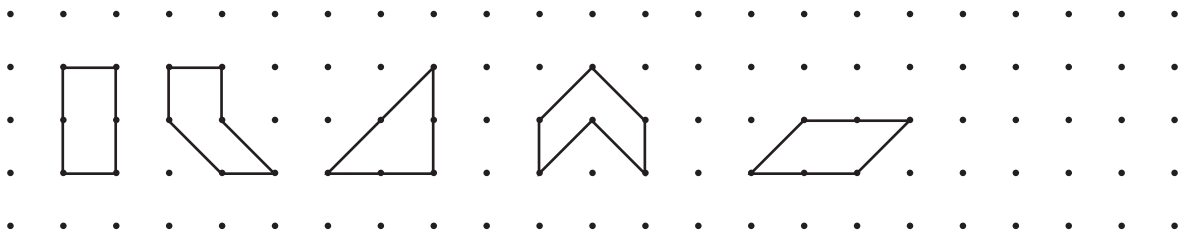


2. These shapes are each made by joining five points, with no points inside.

   What is the area of each shape?



3. Find the area of each of these shapes:



4. Draw more shapes and complete this table. Remember that there must be no points inside the shapes.

No. of Points	4	5	6	7	8	9	10	11	12
Area									

   What would be the area if you joined:

   (a) 20 points, (b) 100 points

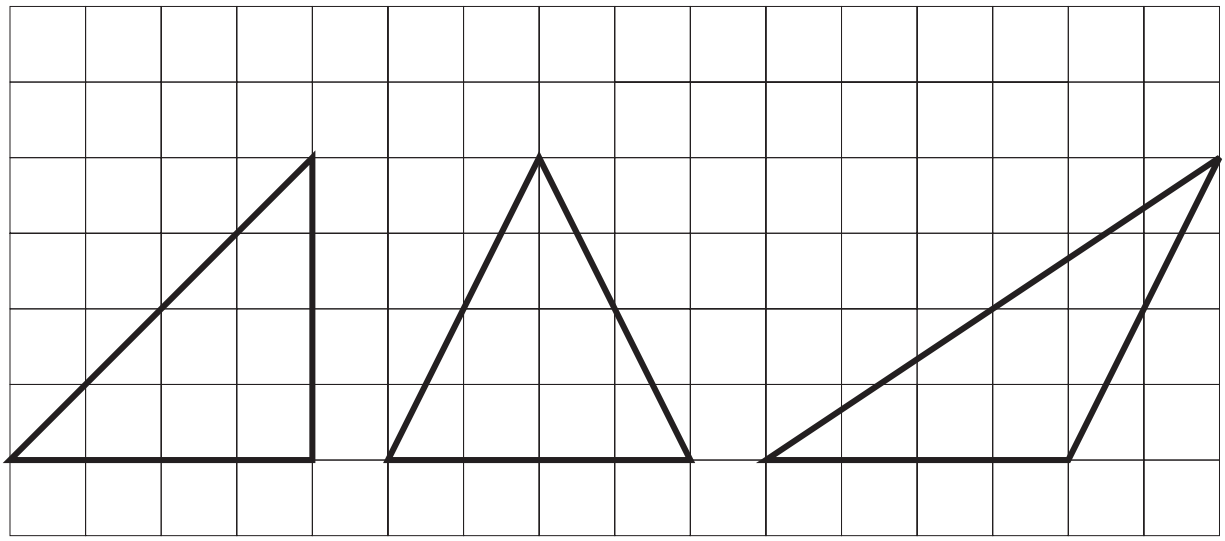
   to make the shape?

Extension

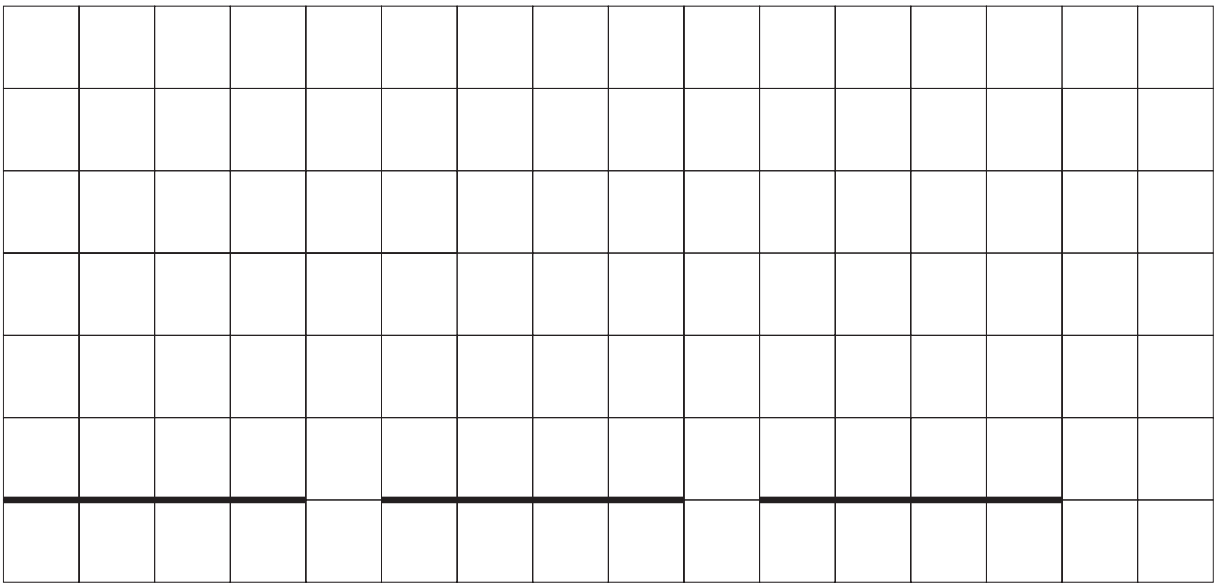
What is the formula for the area of a shape with n points (with no points inside the shape)?

ACTIVITY 9.4 *Areas of Triangles 1*

1. Find the area of each of the triangles below by counting squares:



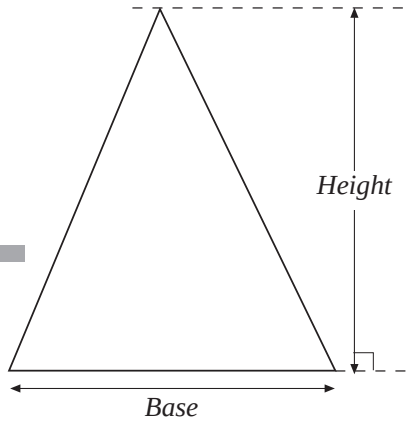
2. Using the lines given as one side, draw three different triangles so that each has the same area as the triangles in question 1.



3. The diagram shows how to measure the base and height of a triangle.

   Measure the base and height of all the triangles in questions 1 and 2.

   Explain why the area of each triangle is the same.

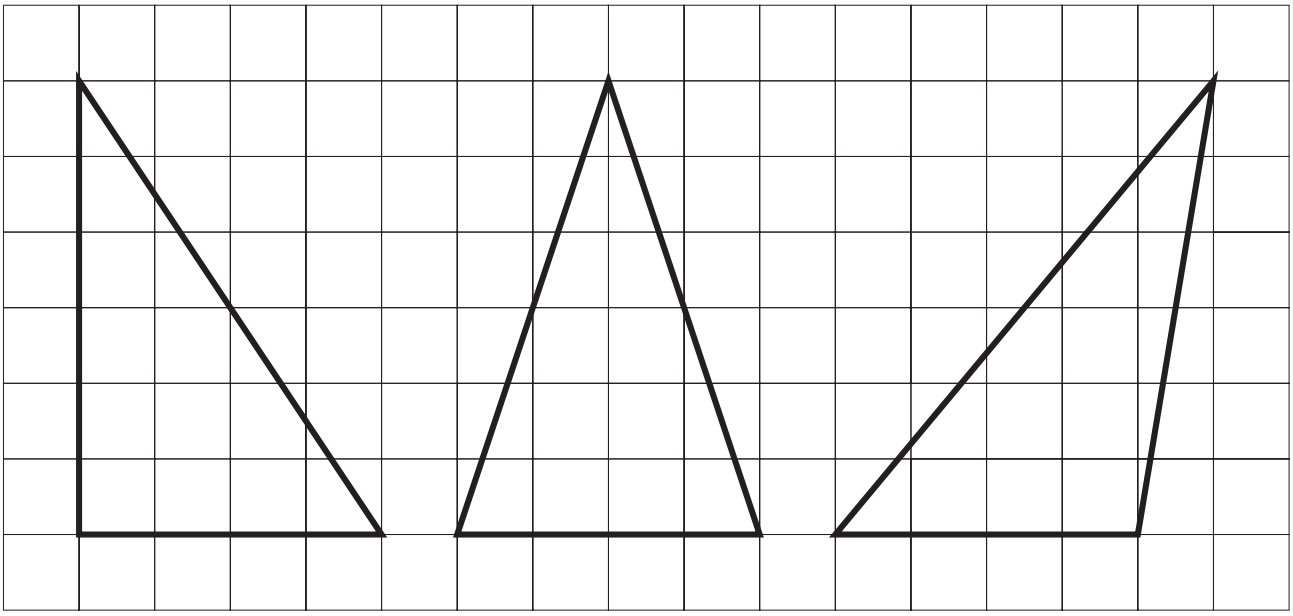


Extension

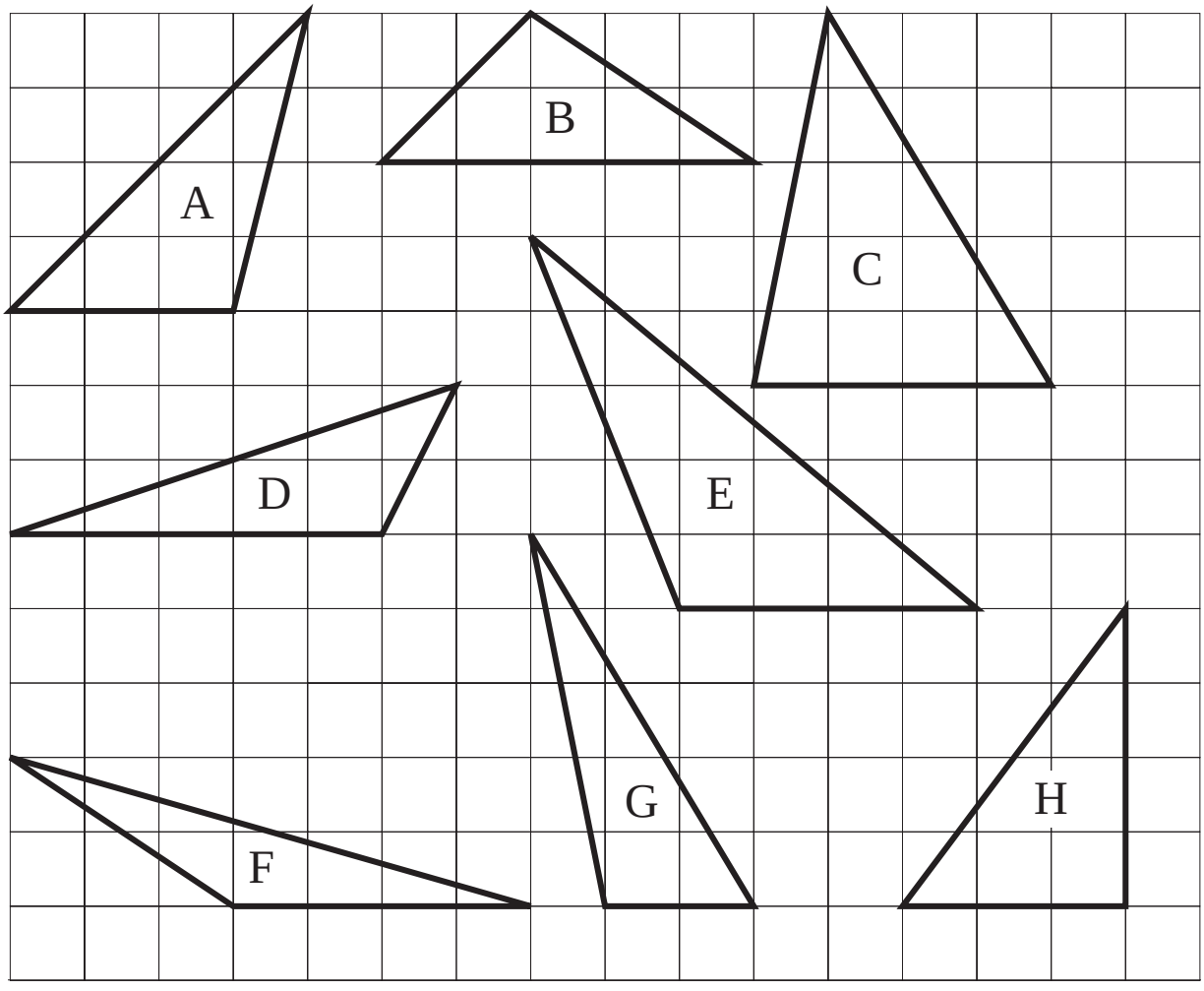
Find some other triangles that have the same areas as those in questions 1 and 2, but have different base and height lengths.

ACTIVITY 9.5 *Areas of Triangles 2*

1. Explain why each of the triangles below has the same area, and find this area.



2. *Without* finding their areas, decide which of the triangles below have the same area.

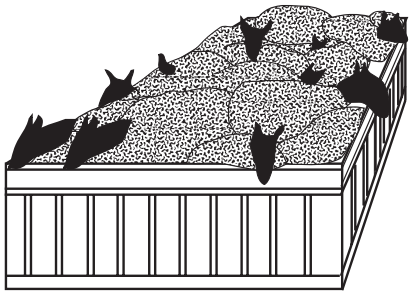


ACTIVITY 9.6 *Fence it Off*

We often use mathematics to make the best possible decisions about resource allocation.

In the problems which follow, the farmer has to decide how best to use a limited amount of fencing. Builders, planners and engineers often have similar problems to solve.

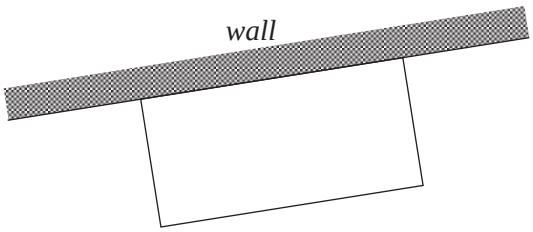
1. A farmer has exactly 200 metres of fencing with which to construct a rectangular pen for his sheep. In order to enclose as much grass as possible, the farmer tries out different dimensions and finds the area in each case.



Dimensions (m)	*Area* (m^2)
5 and 95	475
10 and 90	900
15 and 85	1275
.....	.....

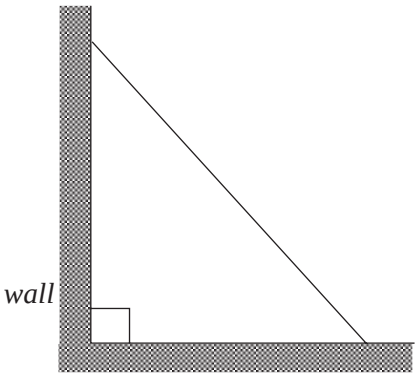
Complete the table and find the dimensions which give the *maximum* area.

2. The farmer again wants to form a rectangular pen, but this time a long, straight wall will form one of the sides.



With his 200 m of fencing, what is the largest area of grass that he can enclose?

3. The farmer now wishes to use his fencing to cut off a corner of a field, as in the diagram.



If the length of fencing is again 200 m, what is the maximum area that can be enclosed?

ACTIVITIES 9.1 - 9.4 *Notes and Solutions*

Notes and solutions are given only where appropriate.

9.1 The area of Ted's hand is approximately 160 cm^2.

9.2 A. Each has area 12 cm^2.

Other examples include:

(and each of the three shapes rotated by $90°$)

No, the perimeters are *not* the same.

B. Each has perimeter of 20 cm.

Rectangles 8 by 2, 7 by 3, 5 by 5, etc, all have perimeter of 20 units.

No, areas are the *not* the same.

9.3 1. Each shape has an area of 1 square unit (1 cm^2).

2. Each shape has an area of $1\frac{1}{2}$ square units ($1\frac{1}{2}\,\text{cm}^2$).

3. Each shape has an area of 2 square units (2 cm^2).

4.

No. of Points	4	5	6	7	8	9	10	11	12
Area	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5

(a) 9 (b) 49

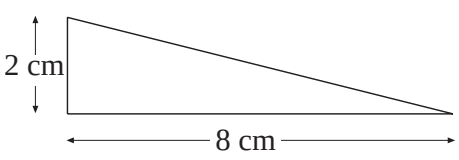
Extension Area $= \frac{1}{2}n - 1$

9.4 1. All have area 8 square units (8 cm^2).

3. All have height and base of 4 units (4 cm).

Area $= \frac{1}{2} \times \text{base} \times \text{perpendicular height}$, and so is the same for each triangle.

Extension There are many examples, e.g.



ACTIVITIES 9.5 - 9.6 *Notes and Solutions*

9.5 1. Same base and perpendicular height. Area = 12 square units (12 cm^2)

2. A and H.
   B, D, F and G
   C and E

9.6 1. $50 \times 50 = 2500\ m^2$

2. 50, 100, 50 $\Rightarrow$ 5000 m^2

3. Place symmetrically; area = 10 000 m^2