Review of 7th Grade Geometry

In the 7th Grade Geometry we have covered:

1. Definition of geometry. Definition of a polygon. Definition of a regular polygon. Definition of a quadrilateral. Types of quadrilaterals with their definitions. Definition of a triangle. Definition of an isosceles, equilateral and right triangle (Chapter 3, Book 1 and 2).

2. Transformations of shapes: translations, rotations, symmetries and enlargements. How to perform these transformations on a given original shape. (Chapter 3, Book 1 and 2 and Chapters 11 and 24, Book2).

3. Measurement and constructions using ruler, straight edge and/or compass of: segments, angles of different measures, perpendicular bisector of a given segment and the bisector of an angle, triangles in the cases SAS, ASA or SSS, regular polygons and circles or arcs of given radii (Chapter 10, Book 1 and Book 2).

4. Properties of angles: definitions and relations of supplementary angles, angles opposite at a vertex, and angles formed with parallel lines: correspondent and alternate (internal and external), properties of the angles in a triangle and in a quadrilateral (Chapter 17, Book 1 and Book 2).

5. Area, perimeter and volume: fundamental definitions of perimeter, area and volume, and the use of these definitions to derive (and memorize) formulas for perimeters and for the area of a triangle, of a parallelogram, of a trapezium and of a composite shape. The formulas for the volume of a cuboid and for its surface area (Chapter 18, Book 1 and Book 2).

6. Elements of a circle and the formula for its circumference and for its area (Chapter 18, Book 2).

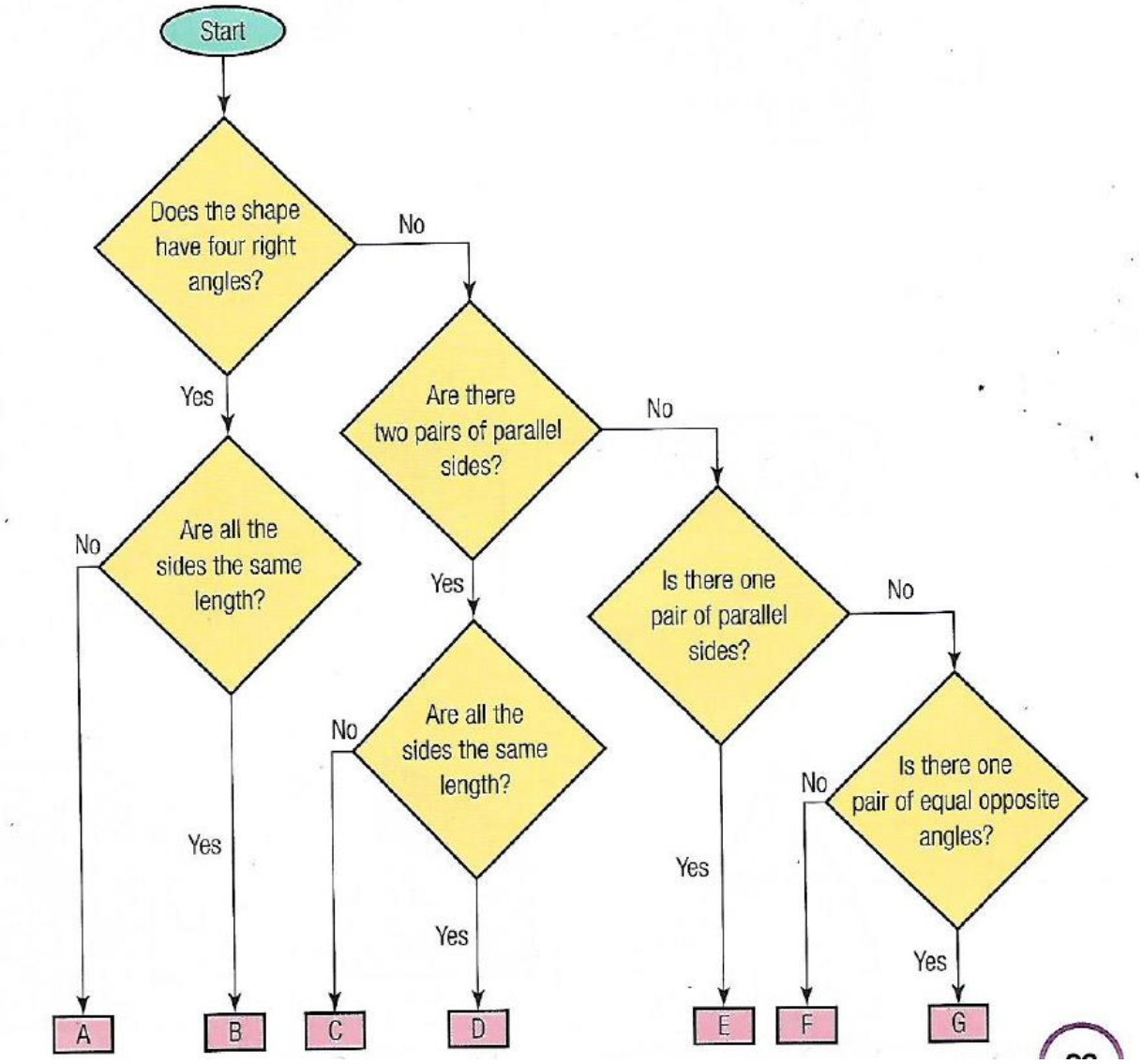
7. Coordinates in 1D and in 2D : reading coordinates and representing points and figures based on points in a cartesian grid. The equation of a line: graphing a line when its equation is given and finding the equation of a line when its graph is given. (Chapter 24, Book 1 and Chapter 16, Book2).

8. Scale drawing (Chapter 24, Book 2).

9. Definition of a general prism, and particular cases of cuboids and cubes. The surface area and the volume of a cuboid. Nets and surface area of three dimensional objects (Chapter 25, Book 1 and Book 2).

As practice of these topics, solve the following problems:

1. Determine what quadrilateral corresponds to each letter in the flow-chart below:

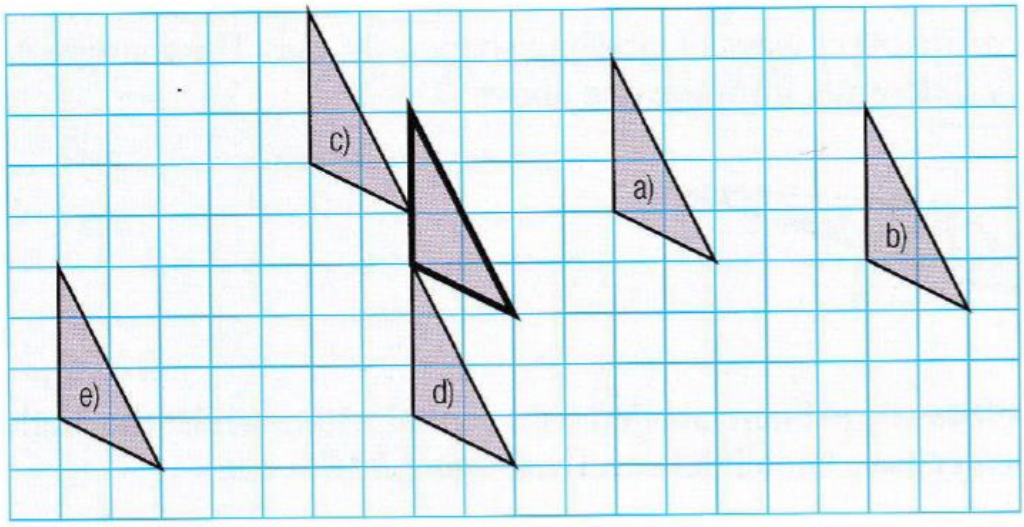


2.

What quadrilateral is each of the following? (see Exercise set 3.2 in Book 2).

3.

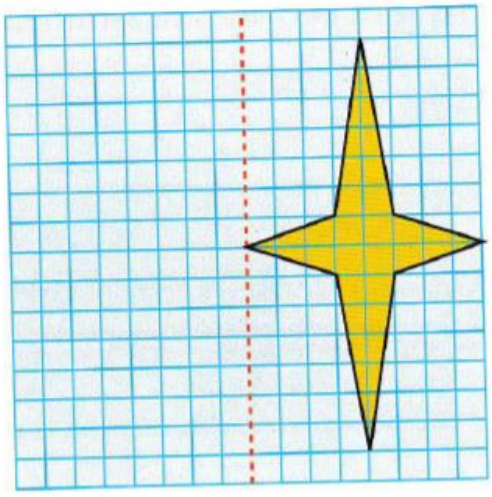
For the grid below, describe the translation which takes the given object to each of the images **a)**, **b)**, **c)**, **d)**, and **e)**.



4.

The object and the mirror line is given. Draw the image of the original shape.

3



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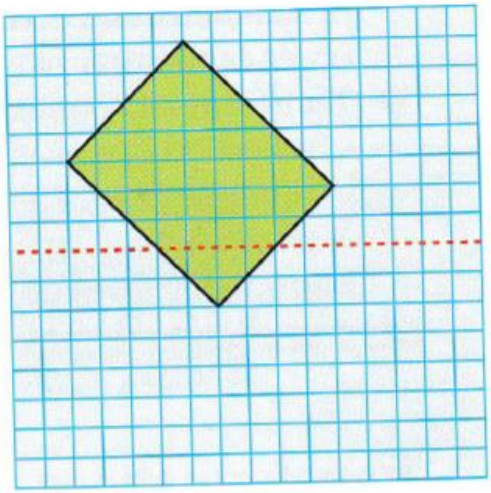
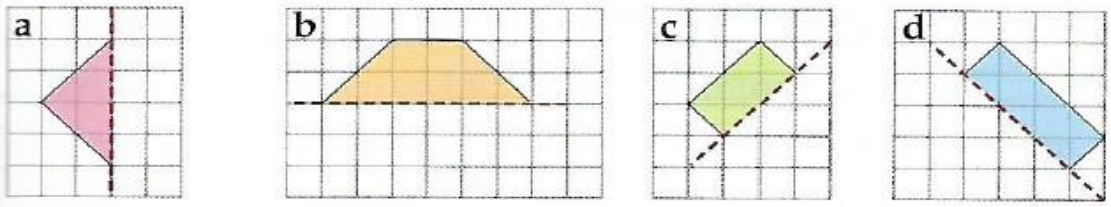


5.

Copy each diagram on square grid paper. Reflect the shape in the mirror line. Give the name of the completed shape and state if it is regular.



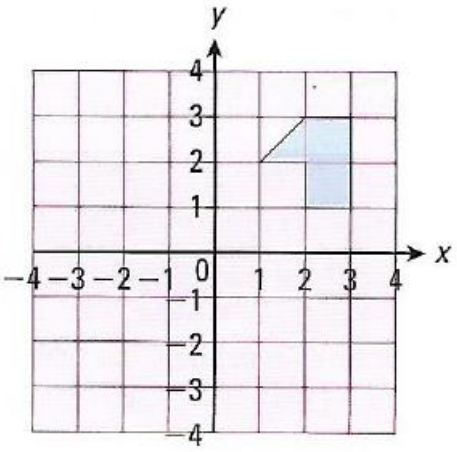
6.

Copy the diagram on square grid paper.

a Reflect the blue hexagon using the x-axis as the mirror line.
Label the shape A and give the coordinates of the vertices.

b Rotate the blue hexagon through 180° about the point (0, 0).
Label the shape B and give the coordinates of the vertices.

c Translate the blue hexagon by 4 units to the left.
Label the shape C and give the coordinates of the vertices.



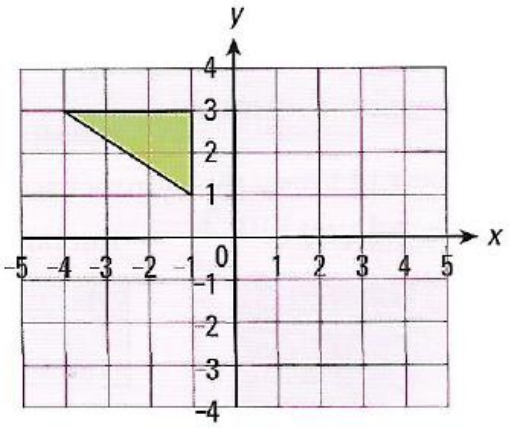
7.

The green triangle is rotated clockwise through 180° about (0,0).

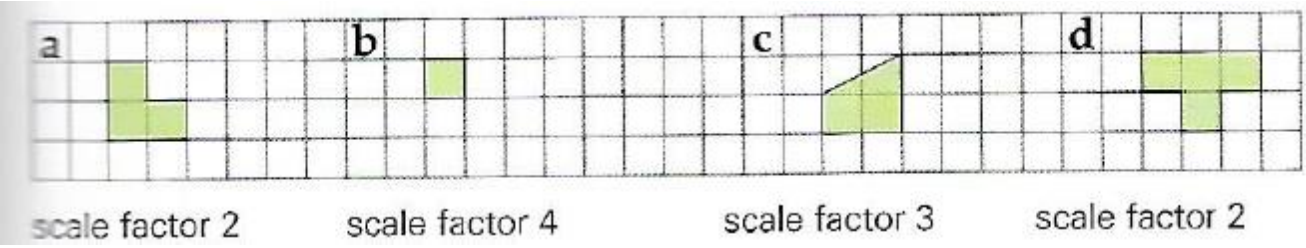
a Draw the image and label it I_1.

b The triangle I_1 is reflected in the x-axis.
Draw the new image and call it I_2.

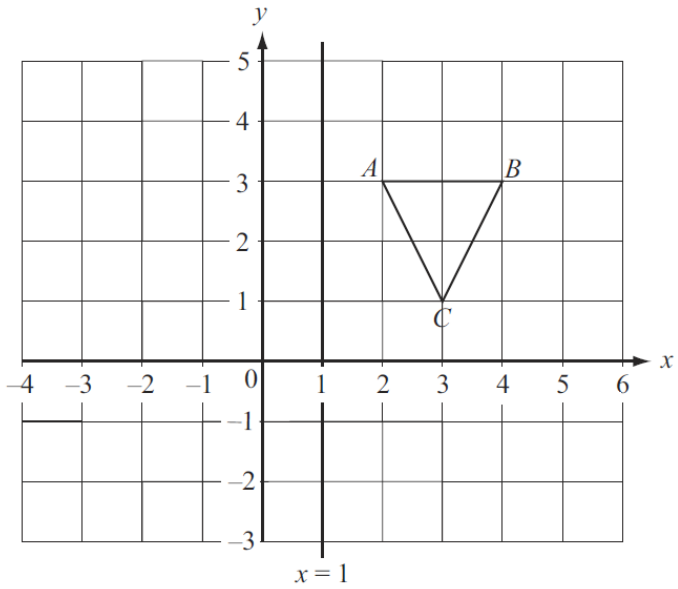
c Describe the single transformation that moves the green triangle to I_2.



8. Cope the shapes on square grid paper and enlarge each shape by the given scale factor:



9. Look at the diagram below:



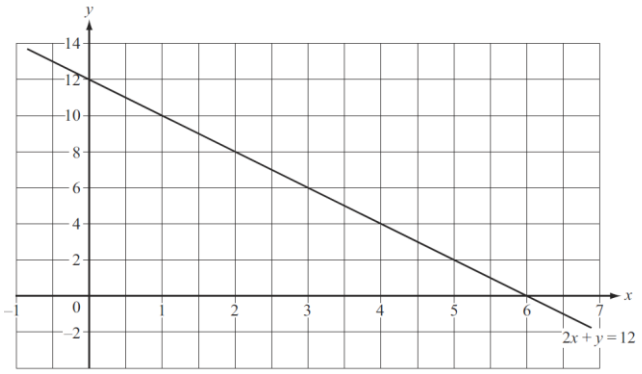
a) Write down the coordinates of points B :

b) The triangle ABC is reflected in the line $x=1$ to give a new triangle PQR . Draw the new triangle PQR on the diagram above.

c) The original triangle ABC is rotated 90^o clockwise about the point (3,1) to give a new triangle $A'B'C'$ .Write the coordinates of B' .

d) Considering that each unit square on the diagram above represents 1 cm^2 , work out the area of triangle ABC:

10. The grid below shows the line with equation: $2x + y = 12$:



a) A different equation of another line is: $y = 2x + 2$

Complete the T chart below for the line: $y = 2x + 2$:

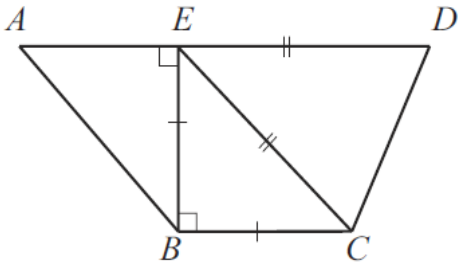
x	0	2	4	6
y				

b) Draw the line $y = 2x + 2$ on the grid above

c) Write down the solution of the simultaneous equations:

$\begin{cases} 2x + y = 12 \\ y = 2x + 2 \end{cases}$. Visualize this solution on your graph.

11. The trapezium below is made up of triangles:

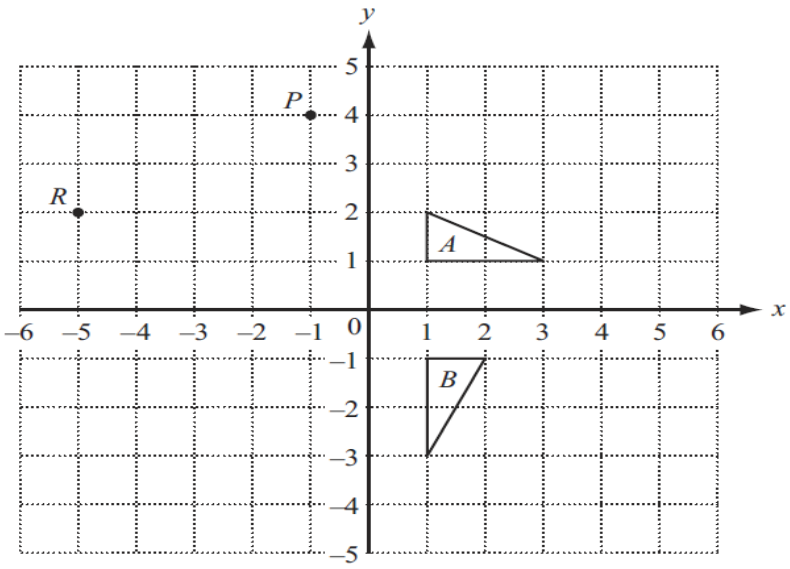


Triangles ABE and BCE are right angled triangles. Triangles CDE and BCE are isosceles triangles (CE=DE and BC = BE) . We know that AE=3cm and EB=4cm .

Work out the length of AD.

12.

The diagram shows triangles A and B and point P and R on a grid.



(a) Mark the point (3, 2). Label it Q.

(b) Point M is the midpoint of the line PR.
Write down the coordinates of M.

(.....,.....)

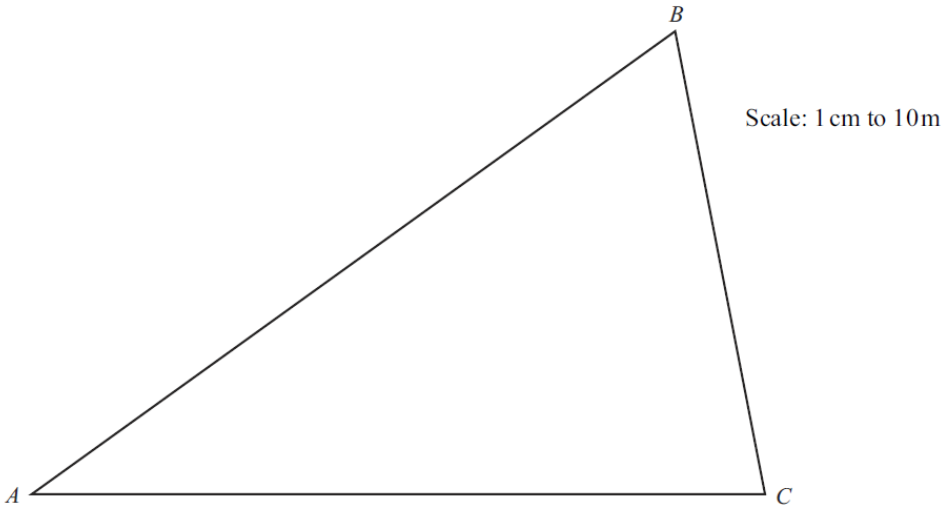
(c) Reflect triangle A in the y-axis.
Label the image C.

(d) Describe in full the rotation that maps triangle A onto triangle B.

.....

13.

The diagram below shows a triangular plot of land drawn to a scale of 1 cm to 10 m.

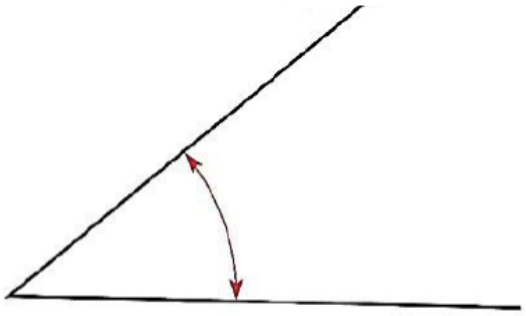


A tree is planted in the plot at point T such that:

- T is 70 meters from point A;
- T is 50 meters from point B ;

Using a compass, mark the point T. Leave all your construction arcs.

14. a) Using a protractor, measure this angle:



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b) Using a compass and the steps outlined in Chapter 10, draw the bisector of this angle. Leave your construction arcs in the figure:

c) Measure each of the new formed angles and confirm if the line draw in part b is the angle bisector.

17. Using a ruler and a protractor, draw the following triangles:

a) AB = 5 cm, $\measuredangle A = 35^o$ and $\measuredangle B = 105^o$

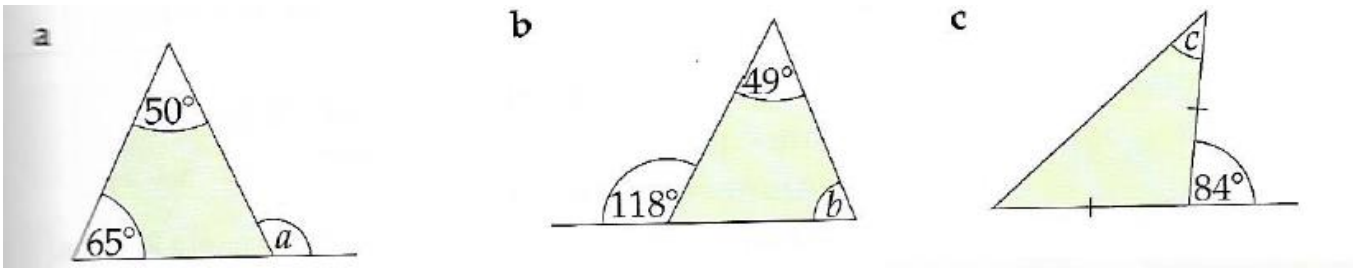
b) AB = 4 cm, $\measuredangle A = 20^o$ and $\measuredangle B = 70^o$

c) AB = 5 cm, AC = 4 cm and $\measuredangle A = 45^o$

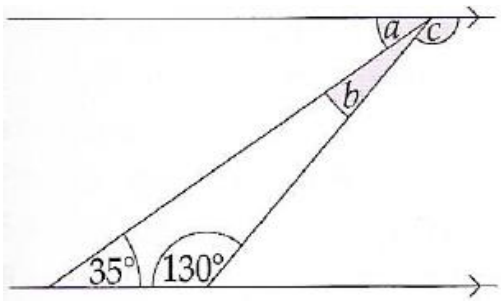
18. Using a ruler and a compass, draw the following triangles. Leave your construction arc visible:
a) AB = 3cm, BC = 4 cm, AC = 5cm

b) AB = 4 cm, BC = 3 cm , AC = 4 cm .

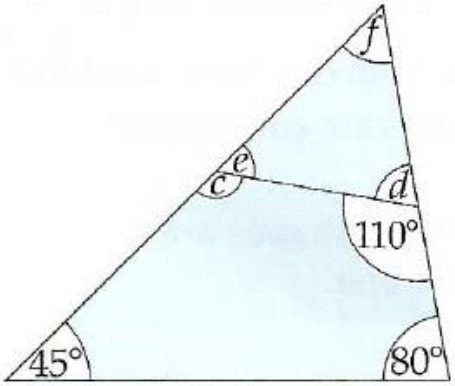
19. Calculate the size of the unknown angles in the following figures:



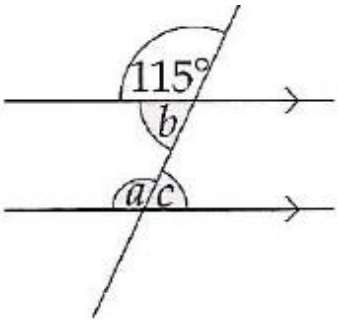
d)

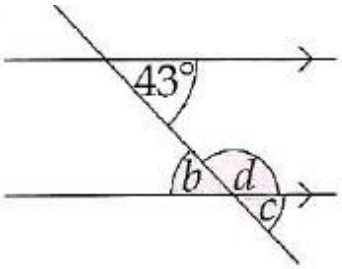


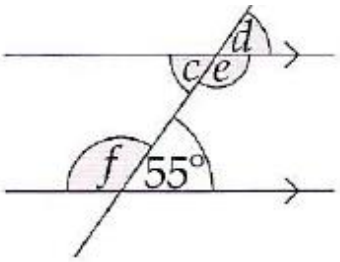
e)



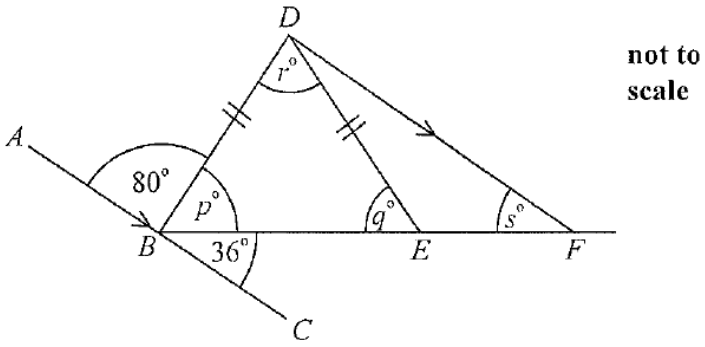
f, g and h:







20.

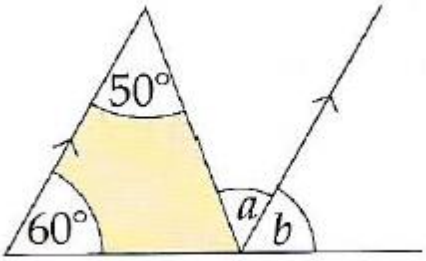


In the diagram above, which is not drawn to scale, ABC is a straight line, parallel to DF. And BD = DE. Work out the sizes of the angles marked p, q, r and s.

21.

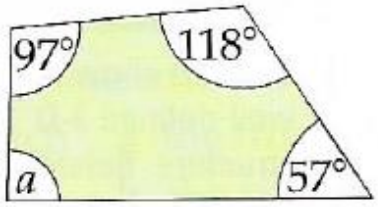
Find the value of

a a
b b
c $a + b$

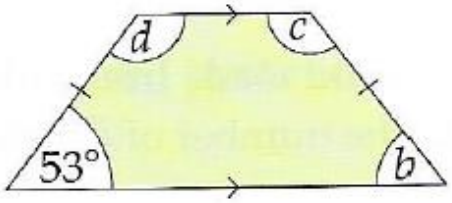


22. Calculate the value of the unknown angles. Support your answers clearly:

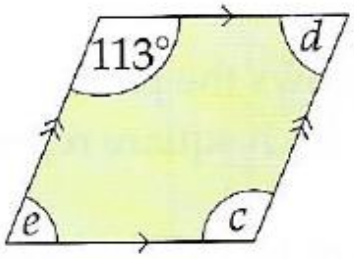
a



b

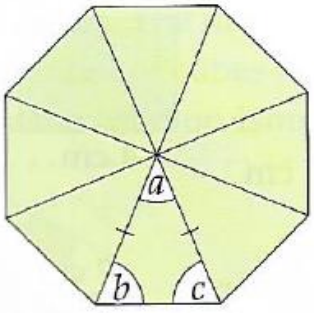


c



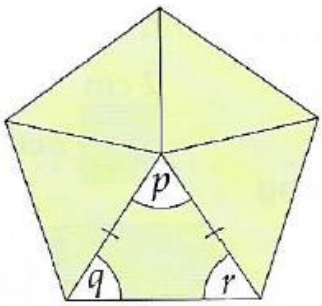
23. Calculate the unknown angles. Support your answers:

a



A regular octagon

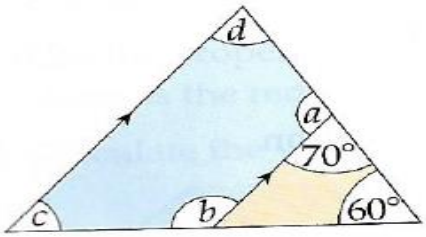
b



A regular pentagon.

24.

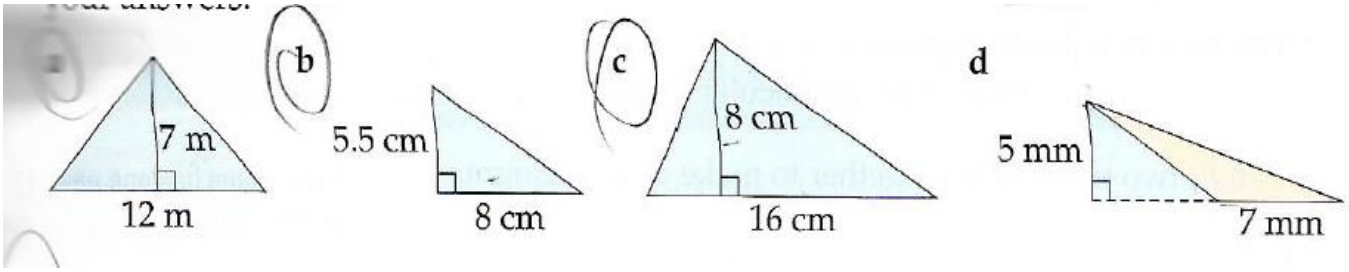
Look at the diagram, made from four straight lines.
The lines marked with arrows are parallel.



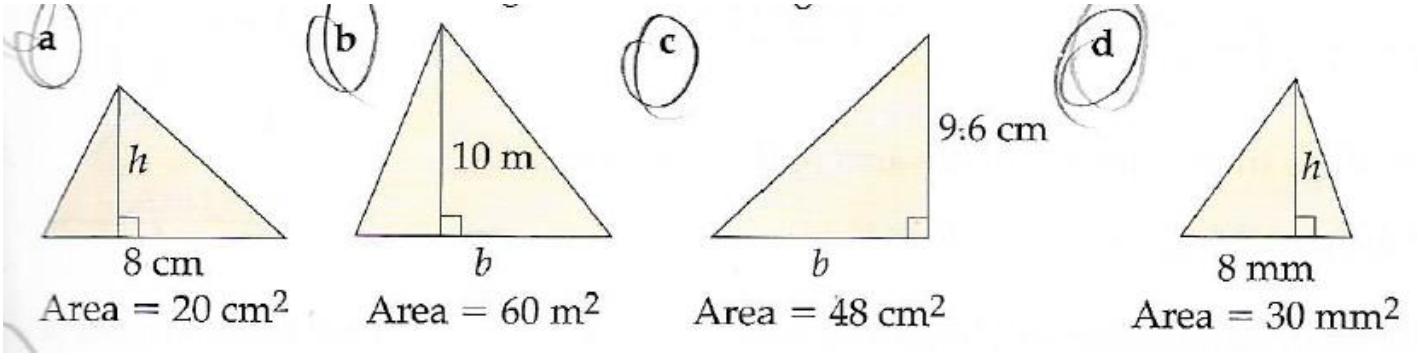
Work out the sizes of the angles marked with letters.

$a =$ ___ ° $b =$ ___ ° $c =$ ___ ° $d =$ ___ °

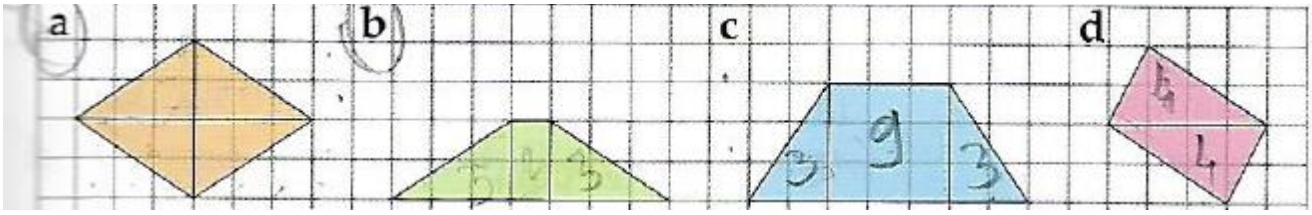
25. Calculate the areas of the triangles below. State the units of your answers:



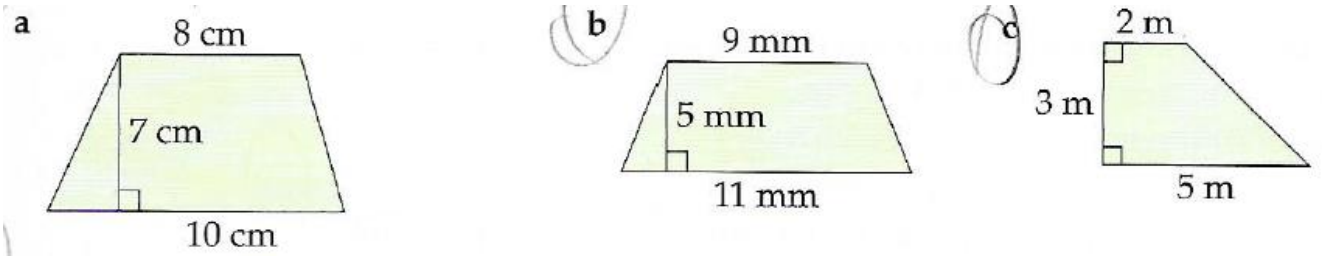
26. Calculate the unknown lengths in these triangles. Show your calculations:



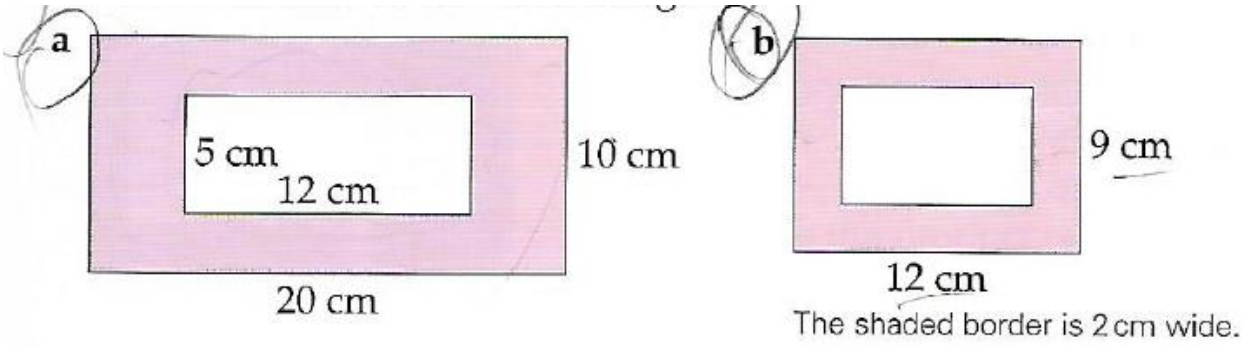
27. Calculate the areas of these shapes. Each unit square represents 1 cm^2 :



28. Calculate the areas of these trapeziums:



29. Calculate the area of the shaded region:



30. On a square grid paper, draw:

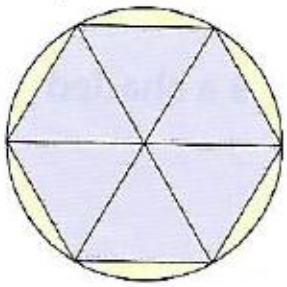
a) two different rectangles, each with an area of $6\ cm^2$ (each unit square represents $1\ cm^2$).

b) two different right angles triangles, each with an area of $6\ cm^2$.

c) two different triangles, neither of them right angled, each with an area of $6\ cm^2$.

31.

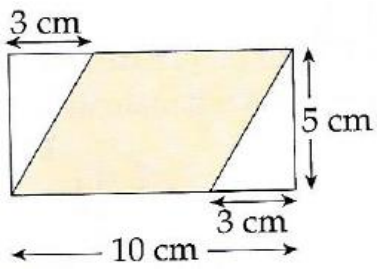
Six equilateral triangles of side 6 cm are arranged to form a hexagon.
A circle is drawn passing through the vertices of the hexagon.
Calculate the circumference of the circle.



32.

A circular pond has a radius of 5 meters. Calculate the surface area of the water.

33. The diagram shows a parallelogram drawn inside a rectangle.



What is the area of the shaded parallelogram (give correct units for your answer) ?

34. Calculate the area of a semicircle with radius 5 centimeters.

35. On a coordinate grid, draw the straight line represented by each of the following equations:

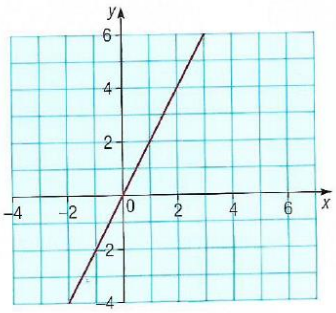
a) $y = x$ b) $y = -x$ c) $y = x + 2$ d) $y = x + 3$

e) $y = x - 3$ f) $y = 3x$ g) $y = -2x$ h) $y = 3 - x$

i) $y = \frac{1}{2}x + 1$ j) $y = -\frac{1}{2}x + 1$ k) $y = -\frac{1}{2}x - 1$

36. For each of the straight lines shown, write a T chart with at least 3 points on the line, and therefore deduce the equation of the line. Use the third point as a check of your equation:

1



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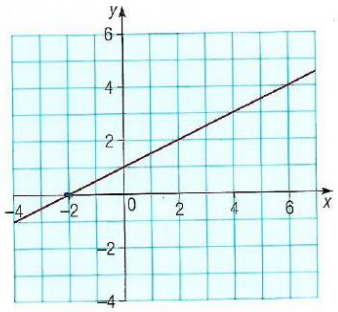

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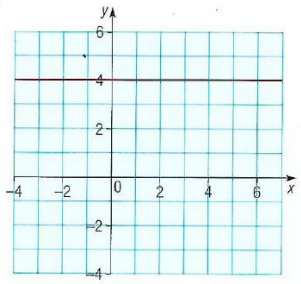

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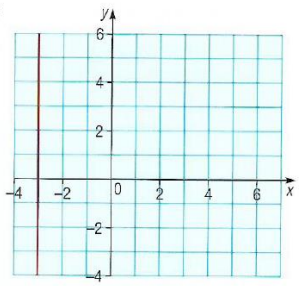

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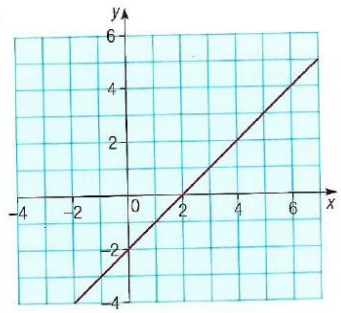

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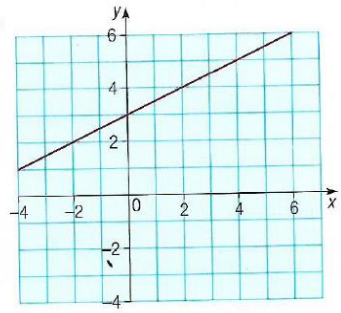

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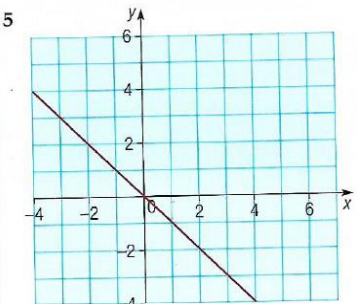

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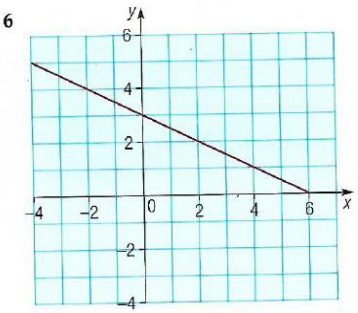
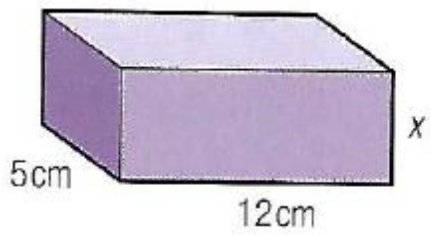
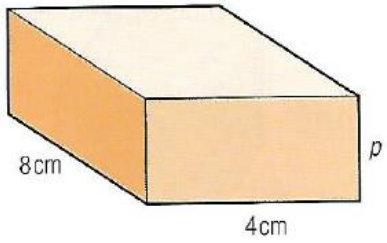


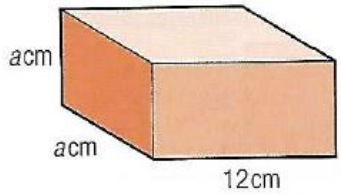
37. The cuboid shown has a volume of 180 cm^3 . Calculate the length (in cm) of the edge marked x:



38. The cuboid shown has a volume of $320\ cm^3$. Calculate the length (in cm) of the edge marked p:

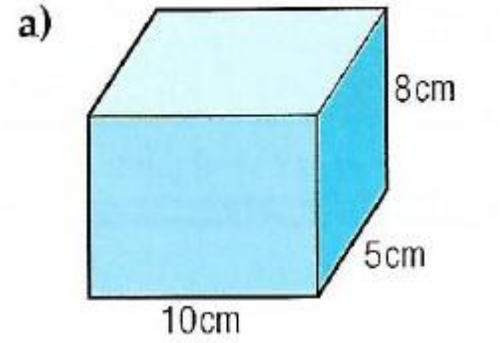


39. This cuboid has a volume of $768\ cm^3$. Calculate the value of the sides marked a (which are equal in length):

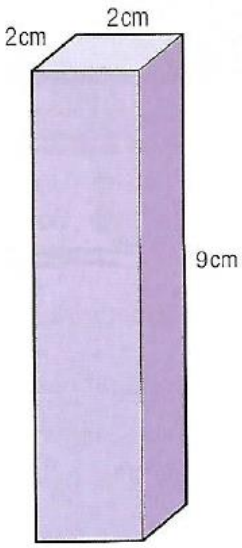


40. Calculate the surface area of the cuboids below:

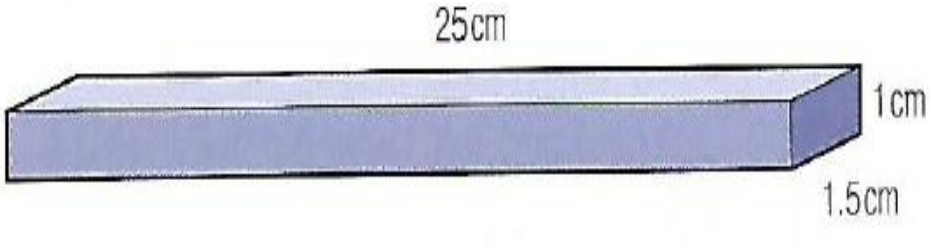
a)



b)



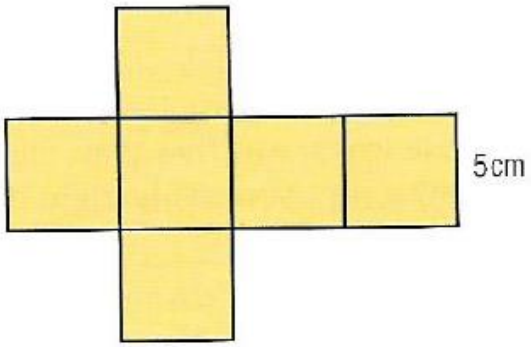
c)



41.

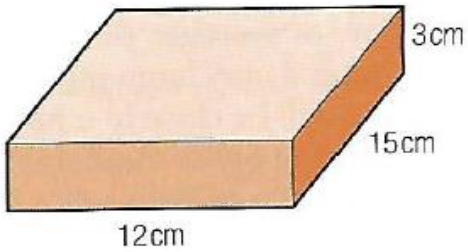
Here is the net of a cube.

Calculate:
a) the surface area of the cube
b) the volume of the cube.



42.

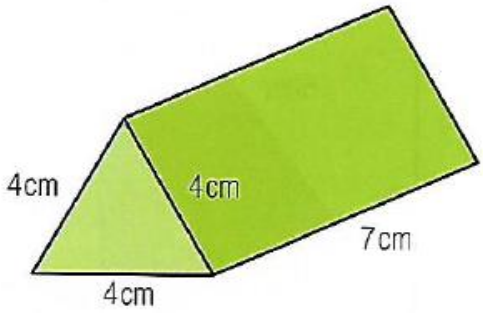
a) Draw two possible nets for this cuboid.



b) Calculate the total area of each net, showing clearly the dimensions of each part of the net.
c) Calculate the volume of the cuboid.

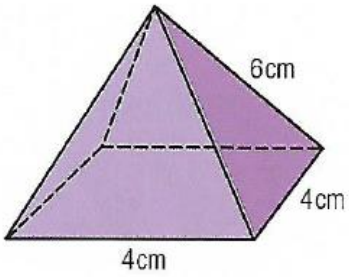
43. For each of the following objects, draw at least two possible nets to scale. Calculate the surface area in each case.

a)



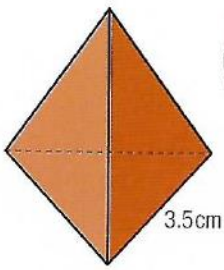
a triangular prism

b)



a square-based pyramid

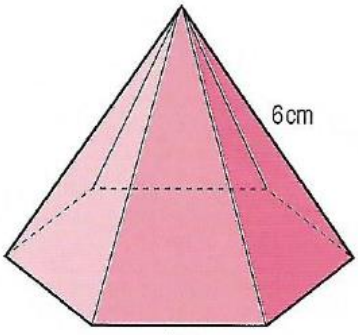
c)



All the faces are equilateral triangles.

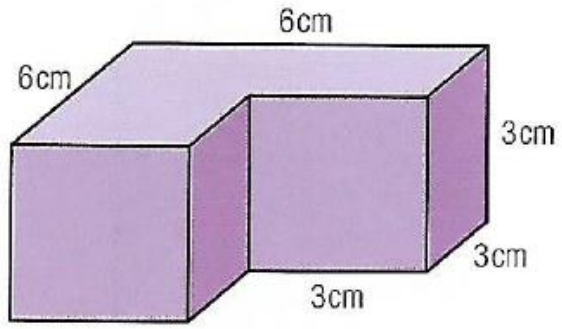
a regular tetrahedron

d)



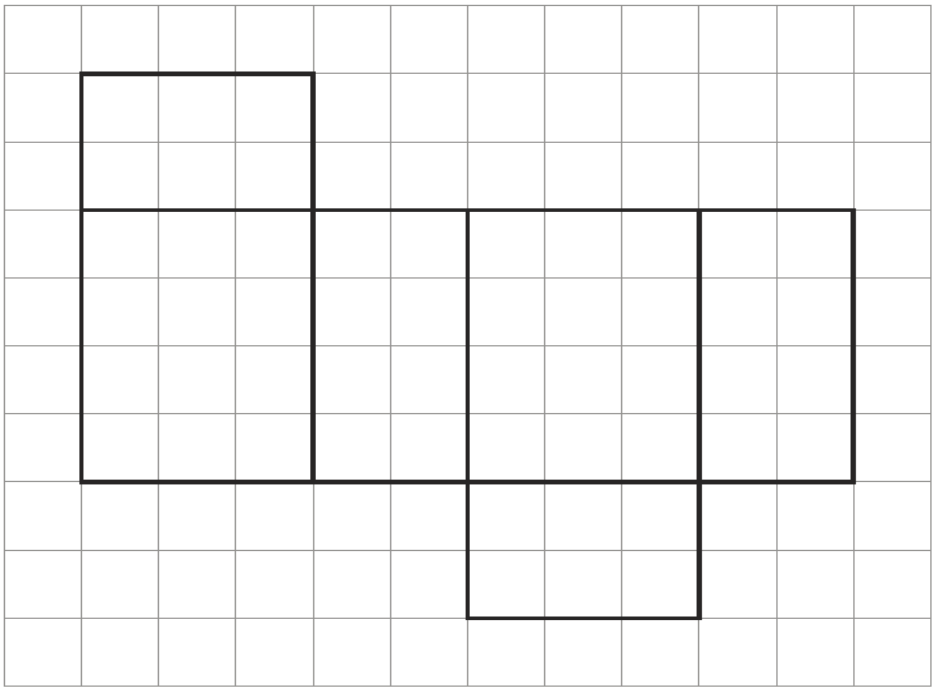
a hexagonal-based pyramid

e)



An L shaped prism.

44. The diagram below shows the full size net of a cuboid drawn on a cm^2 grid:



a) Work out the volume of this cuboid in cm^3 . Show your working clearly.

b) Work out the surface area of this cuboid in cm^2 . Show your working clearly.