Maths and the Mona Lisa

NAME: ....

CLASS: ....

DATE: ....

Basic

1) Express the following ratios in their simplest form:

a) 5:20   b) 14:21   c) 36:18   d) 105:100

2) Express the following ratios in their simplest form:

a) 36:40   b) 6mm:3cm   c) 2.5m:6m

3) The dimensions of a room are length 12m and width 8m. What is the ratio of:
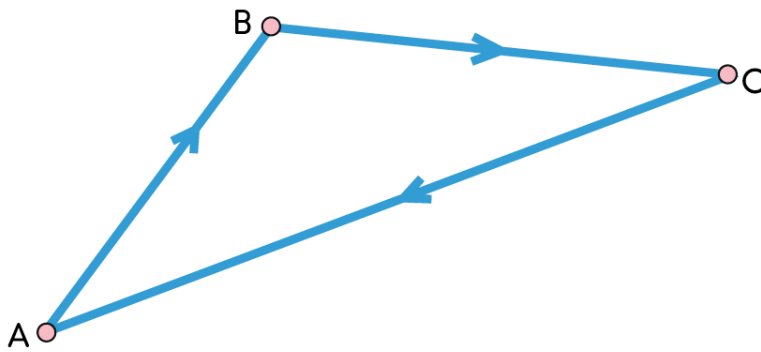
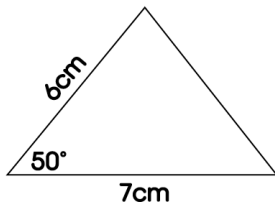a) its length to its width?   b) its width to its length?

Basic

4) The course of a yacht race from point A to point B to point C and back to point A is shown in the diagram below. Using the scale of 1cm to 50km, calculate the total distance of the completed course.
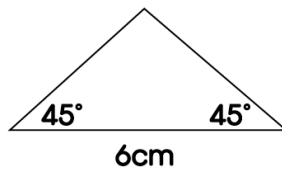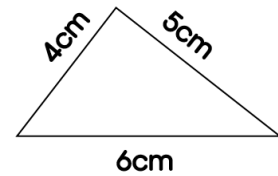

5) Draw the following triangles accurately:

a)

6cm
50°
7cm

b)

45°   45°
6cm

c)

4cm   5cm
6cm

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Core

1) Express the following ratios in their simplest form:

a) 5:20   b) 14:21   c) 36:18   d) 105:100

2) Express the following ratios in their simplest form:

a) 36:40   b) 6mm:3cm   c) 2.5m:6m

3) Express the following ratios in the form 1:n

a) 3:18   b) 4:10   c) 4:31   d) 4:15

4) The perimeter of a triangle is 75cm. The sides have lengths a, b and c. The ratio of b to a is 3:5, and the ratio of c to a is 7:5. Find the length of each side.
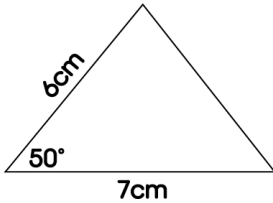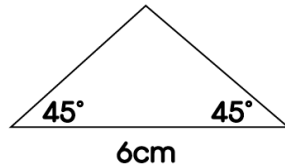
5) Draw the following triangles accurately.

a)

6cm

50°

7cm

b)

45°   45°

6cm

c)

4cm   5cm

6cm
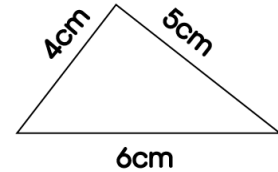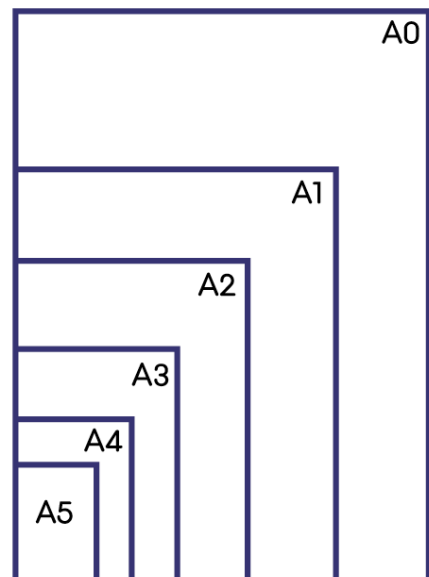
6) The formats for standard paper sizes are as follows:

• The area of A0 is $1m^2$; the area of A1 is $0.5m^2$; that of A2 is $0.25m^2$, and so on.

• All formats are similar.

• Format A1 is A0 cut into two equal pieces. Thus, the length of A1 is the width of A0 and the width of A1 is half the length of A0. In a similar way format A2 is A1 cut into equal pieces.

a) What is the proportion of width and length for each paper format?

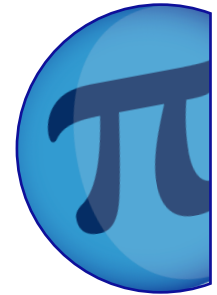b) What are the width and length of a piece of A4 paper?

A0

A1

A2

A3

A4

A5

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Advanced

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1) Express the following ratios in the form 1:n

a) 3:18   b) 4:10   c) 4:31   d) 4:15

2) The perimeter of a triangle is 75cm. The sides have lengths a, b, and c. The ratio of b to a is 3:5, and the ratio of c to a is 7:5. Find the length of each side.

3) The formats for standard paper sizes are as follows:

• The area of A0 is 1m^2; the area of A1 is 0.5m^2; that of A2 is 0.25m^2, and so on.
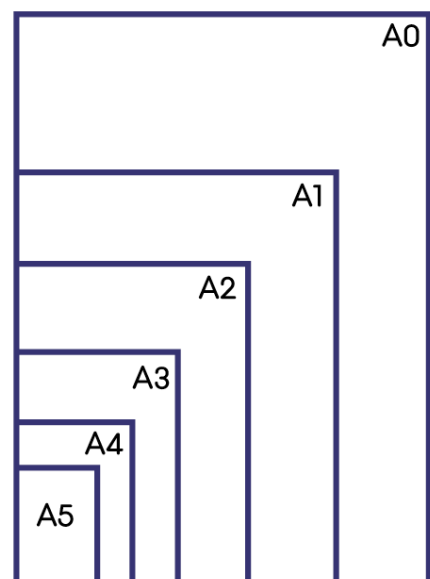
• All formats are similar.

• Format A1 is A0 cut into two equal pieces. Thus, the length of A1 is the width of A0 and the width of A1 is half the length of A0. In a similar way format A2 is A1 cut into equal pieces.

a) What is the proportion of width and length for each paper format?

b) What are the width and length of a piece of A4 paper?

c) If you want to change the size of an A3 picture to A4 format, what percentage reduction would you have to make?

Advanced

4) A dining room must meet the following design specification:

- It must be cuboid in shape.
- The floor area must be greater than 15m^2 and less than 30m^2.
- It must have a floor diagonal of at least 7m.
- It must have a diagonal from the floor to the ceiling that makes an angle of between 15° and 25°.
- The height of the room must be less than 3m but greater than 2m.

Draw a scale model of the net of a possible room that meets the above design requirements.

ANSWERS

Basic

1) a) 1:4   b) 2:3   c) 2:1   d) 21:20

2) a) 9:10   b) 1:5   c) 5:12

3) a) 3:2   b) 2:3

4) 720km

Core

1) a) 1:4   b) 2:3   c) 2:1   d) 21:20

2) a) 9:10   b) 1:5   c) 5:12

3) a) 1:6   b) 1:2.5   c) 1:7.75   d) 1:3.75

4) a = 25cm; b = 15cm; c = 35cm

6) a) 1:1.414   b) 210mm x 297mm

Advanced

1) a) 1:6   b) 1:2.5   c) 1:7.75   d) 1:3.75

2) a = 25cm; b = 15cm; c = 35cm

3) a) 1:1.414   b) 210mm x 297mm   c) 70.7%