



Drawing nets of 3D

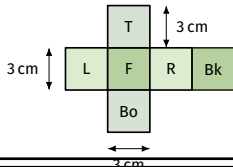
Mana Maths

Start Tasks



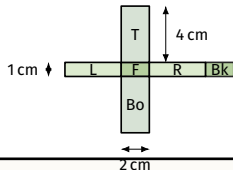
Look carefully at each net. Say which solid it folds into, or draw the net asked for.

1.



2. How many faces does a cube have?

3.

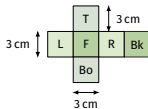


4. On the net in Question 3, which labelled face is opposite the Front (F) face?

Start Tasks — Answers



1. Which solid does this net fold up into?

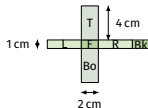


Solution

Cube.

All 6 faces are equal squares.

3. Which solid does this net fold up into?



Solution

Cuboid.

3 pairs of matching rectangles.

2. How many faces does a cube have?

Solution

A cube has 6 faces.

4. On the net in Question 3, which labelled face is opposite the Front (F) face?

Solution

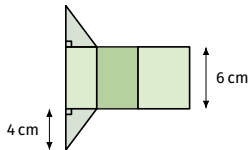
The Back (Bk) face is opposite the Front (F) face.

Start Tasks



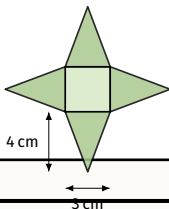
Look carefully at each net. Say which solid it folds into, or draw the net asked for.

5.



6. How many rectangular faces and how many triangular faces does a triangular prism have?

7.

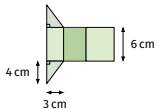


8. How many faces meet at the apex (top point) of a square-based pyramid?

Start Tasks — Answers



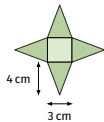
5. Which solid does this net fold up into?



Solution

Triangular prism.
3 rectangles,
2 triangle caps.

7. Which solid does this net fold up into?



Solution

Square-based pyramid.
Base + 4 triangles.

6. How many rectangular faces and how many triangular faces does a triangular prism have?

Solution

3 rectangular faces
and 2 triangular faces.

8. How many faces meet at the apex (top point) of a square-based pyramid?

Solution

4 triangular faces meet at the apex.

Start Tasks



Look carefully at each net. Say which solid it folds into, or draw the net asked for.

9. Draw and label a net for a cube with edge length 2 cm.

10. Draw a net for a cuboid that is 5 cm long, 3 cm wide, and 2 cm high.

11. A net has 4 triangles attached to the 4 sides of a square. What solid does it make?

12. A net has 2 triangles and 3 rectangles. What solid does it make?

Start Tasks — Answers



9. Draw and label a net for a cube with edge length 2 cm.

Solution

Six 2×2 cm squares in a cross: a centre square with one on each side, plus one more above the top square.

11. A net has 4 triangles attached to the 4 sides of a square. What solid does it make?

Solution

Square-based pyramid.

10. Draw a net for a cuboid that is 5 cm long, 3 cm wide, and 2 cm high.

Solution

Sides: 5×2 , 3×2 (each twice). Top/bottom: 5×3 .

12. A net has 2 triangles and 3 rectangles. What solid does it make?

Solution

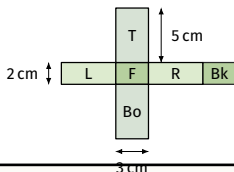
Triangular prism.

Start Tasks

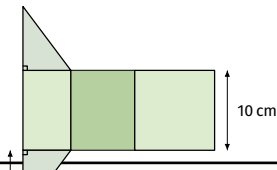


Use each net's labelled dimensions to answer the question, or draw the requested net to scale.

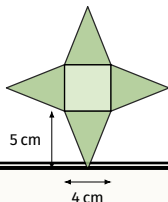
1.



2.



3.

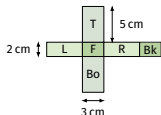


4. A cuboid net has three pairs of congruent rectangles. Explain why a cuboid always has exactly 3 pairs of identical faces.

Start Tasks — Answers



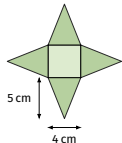
1. Which single face on this net is congruent to the Top (T) face?



Solution

The Bottom (Bo) face.
It is opposite the Top (T).

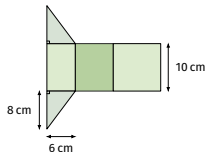
3. This net folds into a square-based pyramid. What is the area of the square base?



Solution

Base is 4×4 :
 $A = 16 \text{ cm}^2$.

2. This net folds into a triangular prism. What is the area of one triangular end face?



Solution

Legs 6 and 8:

$$A = \frac{1}{2} \times 6 \times 8 \\ = 24 \text{ cm}^2.$$

4. A cuboid net has three pairs of congruent rectangles. Explain why a cuboid always has exactly 3 pairs of identical faces.

Solution

A cuboid has 3 pairs of opposite faces (front/back, left/right, top/bottom), and opposite faces are always identical.

Start Tasks



Use each net's labelled dimensions to answer the question, or draw the requested net to scale.

5. Draw an accurate net for a cuboid 6 cm long, 4 cm wide, and 3 cm high, labelling every face with its dimensions.

6. Draw a net for a triangular prism with a 5 cm base, 12 cm height, and 15 cm length.

7. A square-based pyramid net has a base of side 6 cm and four congruent triangular flaps with slant height 8 cm. Draw this net to scale.

8. Two different students draw two different-looking nets for the same cube. Explain how both can be correct.

Start Tasks — Answers



5. Draw an accurate net for a cuboid 6 cm long, 4 cm wide, and 3 cm high, labelling every face with its dimensions.

Solution

A band of four rectangles 6×3 , 4×3 , 6×3 , 4×3 , with a 6×4 top and bottom; label each face.

7. A square-based pyramid net has a base of side 6 cm and four congruent triangular flaps with slant height 8 cm. Draw this net to scale.

Solution

A 6×6 square base with four congruent triangles (base 6 cm, slant height 8 cm) on its four edges.

6. Draw a net for a triangular prism with a 5 cm base, 12 cm height, and 15 cm length.

Solution

Three rectangles 5×15 , 12×15 , 13×15 in a row, plus two right-triangle caps (legs 5, 12; hyp 13).

8. Two different students draw two different-looking nets for the same cube. Explain how both can be correct.

Solution

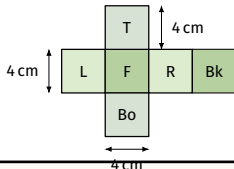
Both use six equal squares that fold up with no gaps or overlaps; only the layout differs (e.g. cross vs staircase).

Start Tasks



Use each net's labelled dimensions to answer the question, or draw the requested net to scale.

9.



10. A cuboid measures 8 cm by 5 cm by 3 cm. List the area of each of the 3 different-sized rectangular faces in its net.

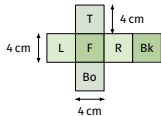
11. A cardboard box maker draws the net of a cuboid 12 cm by 7 cm by 4 cm before cutting it out. Why is drawing the net first useful?

12. Sketch two different valid nets that both fold into the same cube.

Start Tasks — Answers



9. Find the total area of all 6 faces shown in this net.



Solution

Each face $4 \times 4 = 16$.
 $6 \times 16 = 96 \text{ cm}^2$.

11. A cardboard box maker draws the net of a cuboid 12 cm by 7 cm by 4 cm before cutting it out. Why is drawing the net first useful?

Solution

It shows exactly how much card is needed and how the faces connect, so material is not wasted and the box folds together correctly.

10. A cuboid measures 8 cm by 5 cm by 3 cm. List the area of each of the 3 different-sized rectangular faces in its net.

Solution

$8 \times 5 = 40$, $8 \times 3 = 24$, $5 \times 3 = 15 \text{ cm}^2$ (each appears twice).

12. Sketch two different valid nets that both fold into the same cube.

Solution

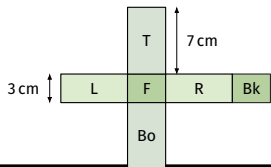
Any two different layouts of six equal squares that fold up cleanly, e.g. a cross shape and a staircase (zig-zag).

Start Tasks

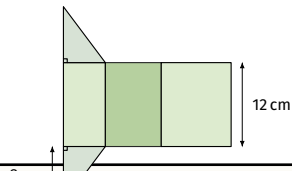


Combine net dimensions with area and reasoning to solve each problem.

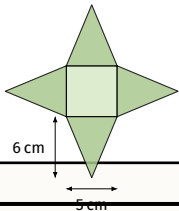
1.



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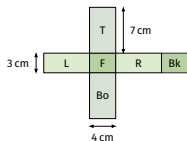
4. A cube net has total area 150 cm^2 . Work out the edge length of the cube.

all 5 faces.

Start Tasks — Answers



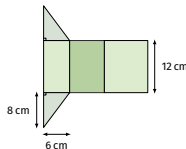
1. Find the total surface area covered by this net (the sum of all 6 face areas).



Solution

$$\begin{aligned}SA &= 2(7 \times 4 + 7 \times 3 + 4 \times 3) \\&= 2(28 + 21 + 12) \\&= 2 \times 61 = 122 \text{ cm}^2.\end{aligned}$$

2. This right-angled triangular prism net has base 6 cm, height 8 cm, and length 12 cm. Find the total area of all 5 faces.



Solution

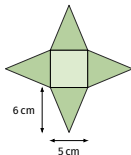
Ends: $2 \times \frac{1}{2}(6)(8) = 48.$

Rects:

$$(6+8+10) \times 12 = 288.$$

$$\text{Total} = 336 \text{ cm}^2.$$

3. This square pyramid net has base side 5 cm and slant height 6 cm. Find the total area of the base plus all 4 triangular faces.



Solution

Base = $5 \times 5 = 25.$

Triangles: $4 \times \frac{1}{2}(5)(6) = 60.$

$$\text{Total} = 85 \text{ cm}^2.$$

4. A cube net has total area 150 cm^2 . Work out the edge length of the cube.

Solution

$$6s^2 = 150$$

$$s^2 = 25$$

$$s = 5 \text{ cm}.$$

Start Tasks



Combine net dimensions with area and reasoning to solve each problem.

5. A closed cuboid box needs 220 cm^2 of card. If its base is 10 cm by 5 cm, find its height.

6. A manufacturer compares two cuboid nets: Box A is 8 cm by 6 cm by 4 cm and Box B is 12 cm by 4 cm by 4 cm. Which net uses less card, and by how much?

7. A triangular prism net has a right-angled triangular cross-section with legs 9 cm and 12 cm, and length 20 cm. Find the total surface area of the net.

8. Explain why a square-based pyramid's net cannot be made from 5 identical squares, and state what shapes are needed instead.

Start Tasks — Answers



5. A closed cuboid box needs 220 cm^2 of card. If its base is 10 cm by 5 cm, find its height.

Solution

$$SA = 2(10 \times 5 + 10h + 5h) = 100 + 30h$$

$$100 + 30h = 220$$

$$30h = 120$$

$$h = 4 \text{ cm.}$$

7. A triangular prism net has a right-angled triangular cross-section with legs 9 cm and 12 cm, and length 20 cm. Find the total surface area of the net.

Solution

$$\text{Hyp} = \sqrt{9^2 + 12^2} = 15.$$

$$\text{Ends: } 2 \times \frac{1}{2}(9)(12) = 108.$$

$$\text{Rects: } (9+12+15) \times 20 = 720.$$

$$\text{Total} = 828 \text{ cm}^2.$$

6. A manufacturer compares two cuboid nets: Box A is 8 cm by 6 cm by 4 cm and Box B is 12 cm by 4 cm by 4 cm. Which net uses less card, and by how much?

Solution

$$\text{Box A: } 2(48 + 32 + 24) = 208.$$

$$\text{Box B: } 2(48 + 48 + 16) = 224.$$

$$\text{Box A uses less, by } 224 - 208 = 16 \text{ cm}^2.$$

8. Explain why a square-based pyramid's net cannot be made from 5 identical squares, and state what shapes are needed instead.

Solution

Five equal squares fold into a cube (or open box), not a pyramid. A pyramid needs 1 square base plus 4 congruent triangles that meet at a single apex.

Start Tasks



Combine net dimensions with area and reasoning to solve each problem.

9. A cube's net has a total area of 96 cm^2 . Find the volume of the cube.

10. A cuboid net is drawn with faces 6 cm by 4 cm, 6 cm by 3 cm, and 4 cm by 3 cm (one of each pair). Find the volume of the cuboid.

11. A gift box designer wants a triangular prism net (base 5 cm, height 12 cm, hypotenuse 13 cm) to fit on a single sheet of card 60 cm by 40 cm. Find the maximum length the prism can be so the net still fits, **showing your reasoning.**

12. Two students each draw a valid net for the same square-based pyramid, but their nets look different on the page. Explain what property both nets must share, and what may differ.

Start Tasks — Answers



9. A cube's net has a total area of 96 cm^2 . Find the volume of the cube.

Solution

$$6s^2 = 96 \Rightarrow s^2 = 16 \Rightarrow s = 4 \text{ cm.}$$

$$\text{Volume} = 4^3 = 64 \text{ cm}^3.$$

11. A gift box designer wants a triangular prism net (base 5 cm, height 12 cm, hypotenuse 13 cm) to fit on a single sheet of card 60 cm by 40 cm. Find the maximum length the prism can be so the net still fits, showing your reasoning.

Solution

$$\text{Net width} = 5 + 12 + 13 = 30 \text{ cm } (\leq 60, \text{ fits}).$$

$$\text{Net height} = L + 2(12) = L + 24 \text{ must be } \leq 40.$$

$$L \leq 16, \text{ so the maximum length is } 16 \text{ cm.}$$

10. A cuboid net is drawn with faces 6 cm by 4 cm, 6 cm by 3 cm, and 4 cm by 3 cm (one of each pair). Find the volume of the cuboid.

Solution

The three edge lengths are 6, 4 and 3 cm.

$$\text{Volume} = 6 \times 4 \times 3 = 72 \text{ cm}^3.$$

12. Two students each draw a valid net for the same square-based pyramid, but their nets look different on the page. Explain what property both nets must share, and what may differ.

Solution

Both must have the same square base and 4 congruent triangular faces of equal measurements; only their arrangement (layout) on the page may differ.