Cross sections of a cube	Season	2
	Episode	16
	Time frame	3 periods

Prerequisites : Cross sections of a tetrahedron. Vocabulary about the cube.

Objectives :
- Fold an origami cube by following instructions.
- Discover the cross sections of a cube.
- Learn the rules to draw a corss section of a cube.

Materials :
- *Instructions and paper of the Origami cube.*
- *Answer sheet for the 10 possible shapes of the cross sections.*
- *Task sheet for the ICT activity.*
- *Examples of correct and incorrect constructions.*
- *Rules for cross sections.*
- *Exercises*

1 – Origami Cube 20 mins

Each student is given instructions to build an origami cube.

2 – Pair work : the possible cross sections of a cube 35 mins

Working in pairs, students have to find 10 possible shape for the sections of a cube :

1. equilateral triangle ;
2. isosceles triangle ;
3. scalene triangle ;
4. square ;
5. rectangle :
6. parallelogram ;
7. isosceles trapezium ;
8. trapezium ;
9. pentagon ;
10. hexagon.

3 – ICT activity — 25 mins

Working in pairs, students go to the website :

`http://www.mhhe.com/math/ltbmath/applets/ch9/index.html`

They have to solve each of the 11 problems, do a screen capture for each solution and put all the screen captures on a single document that they will save and send to the teacher.

4 – Correct and incorrect constructions — 30 mins

Students work in pairs. They are given a page with some cross sections of a cube constructed. Some constructions are correct, others are not. They have to decide what are the correct ones and rectify the incorrect ones.

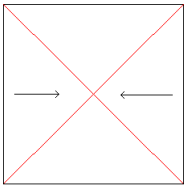
5 – How to build a cross section of a cube — 15 mins

Using a beamer, the teacher shows the main methods to draw a cross section of a cube. The most important rules are introduced, along with the problem of apparent coplanarity and collinearity in perspective drawing.

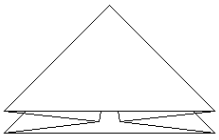
6 – Exercises — Remaining time

Still working in pairs, students have to draw some cross sections of a cube.

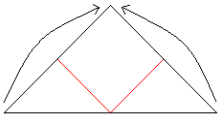
An origami cube	Season	2
	Episode	16
	Document	Instructions



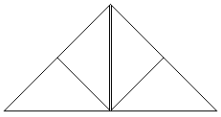
Fold a square sheet of paper at the diagonals and unfold it.
Put the paper at both arrows together.
Lay the triangles at the top and at the bottom on top of each other.



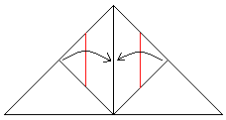
The result is a flier triangle, which is known as the swallow or the pigeon.



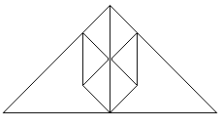
Fold upward on the red line on the right and on the left.



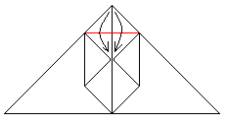
Then it must look like this.



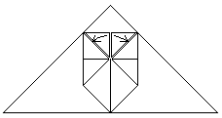
Fold on the red lines.



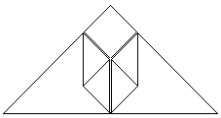
Then it must look like this.



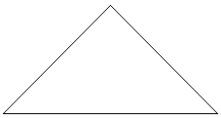
Fold the two little triangles on the red lines downward.



Put the last made triangles in the two pockets on the right and on the left. This is a little bit fiddly.

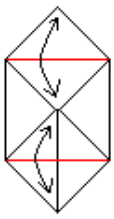


Then it must look like this.

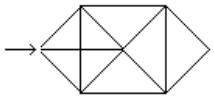


Turn the whole triangle and repeat the steps 3,4,5,6,7,8,9.

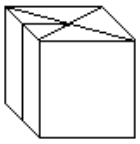
Then it must look like this.



Fold and unfold on the red lines.

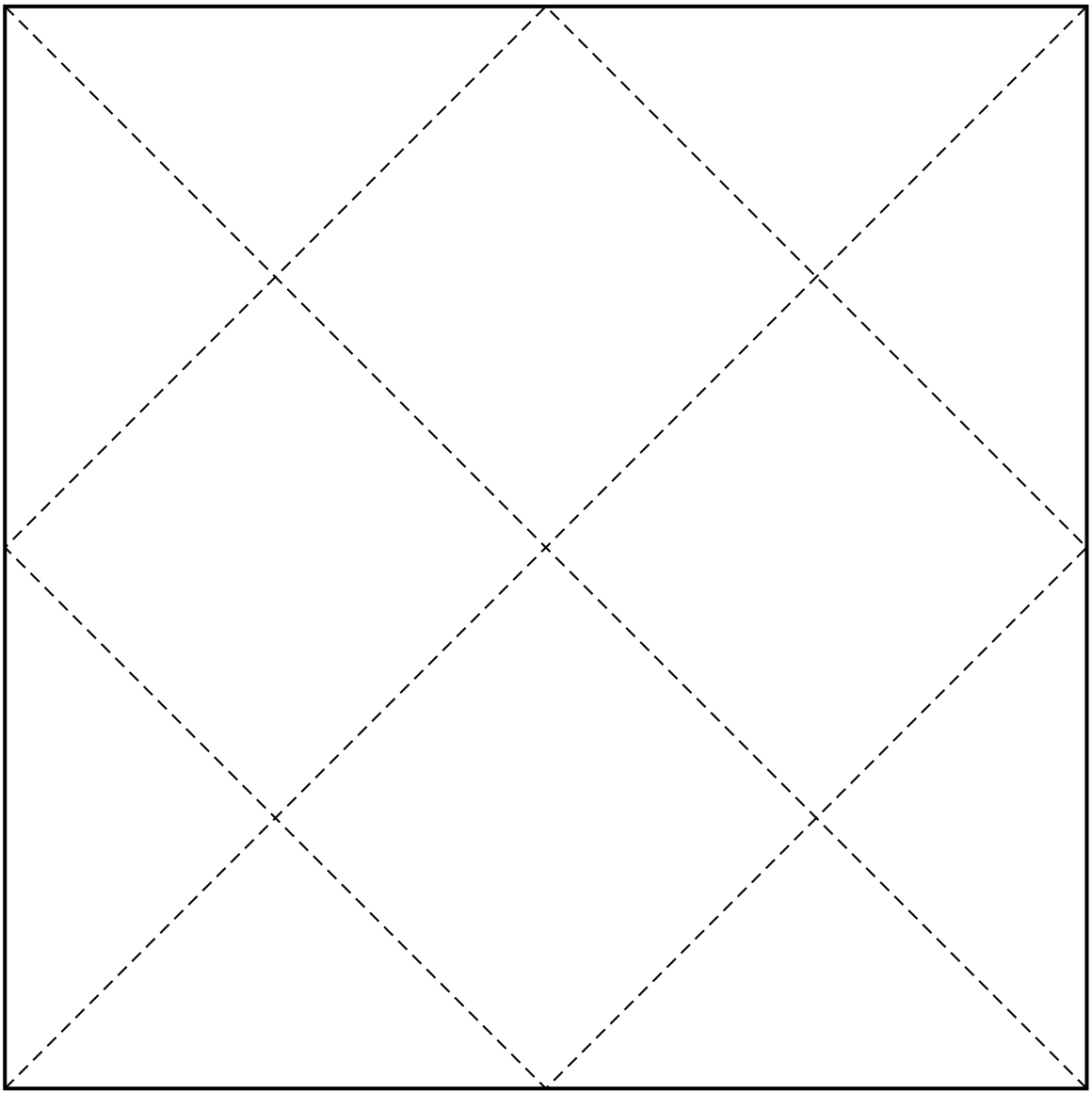


Take the folded cube in hand and blow into the hole at the top. Unfold the cube by this.



The cube is ready.

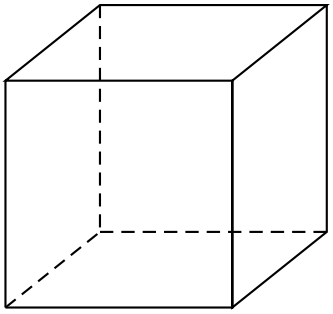
An origami cube	Season	2
	Episode	16
	Document	Cut-out square



Cross sections of a cube	Season	2
	Episode	16
	Document	Answer sheet

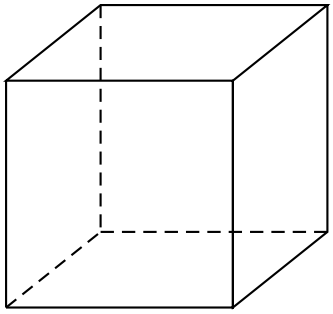
Section 1

The cross section is .....



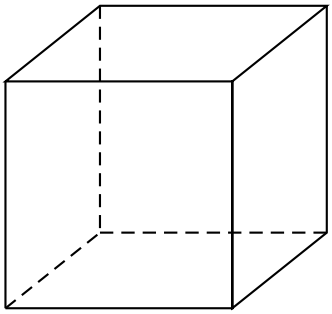
Section 2

The cross section is .....



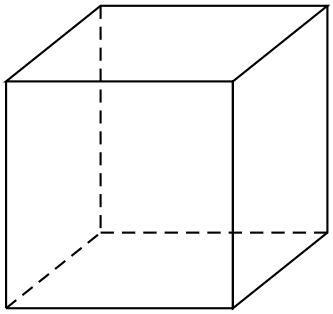
Section 3

The cross section is .....



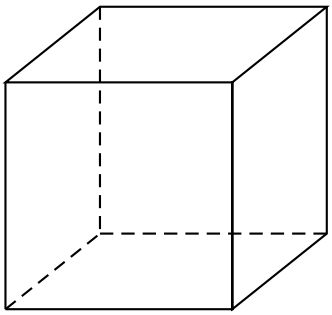
Section 4

The cross section is .....



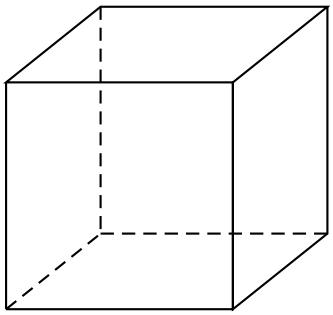
Section 5

The cross section is .....



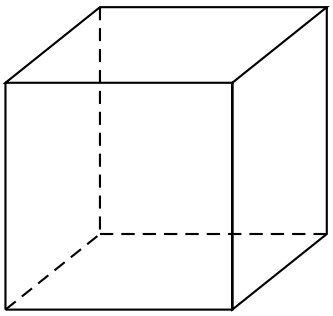
Section 6

The cross section is .....



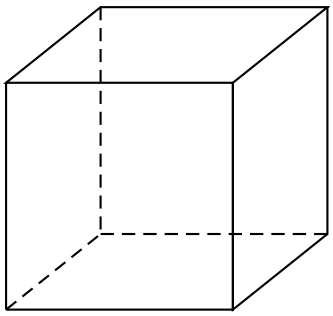
Section 7

The cross section is .....



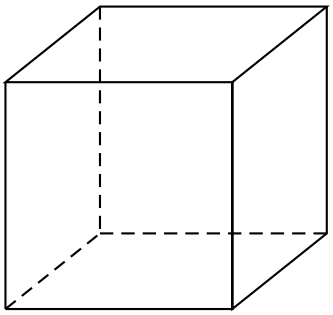
Section 8

The cross section is .....



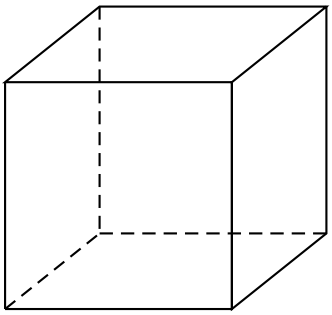
Section 9

The cross section is .....



Section 10

The cross section is .....



Cross sections of a cube	Season	II
	Episode	4 - Cross sections
	Document	16

For this activity, you need to remember that *any three non-collinear points define a plane.* We will use this property to build various kinds of cross sections of a cube, with a java applet.
Log on to the computer and use the internet browser to load the page.

`http://www.mhhe.com/math/ltbmath/applets/ch9/index.html`

- For each shape in the top-left pull-down, find three points on the cube, not on the same edge, so that the plane defined by these three points is the desired shape.
- Click the Create button to check your choice. If it's not correct, try again. If it's correct, do a capture of a screen and copy it in a word processor document.
- You have 20 minutes to find the 10 possible cross sections in the menu. At the end, you should have a word processor with 10 images. Save it under your name and send it to Mr Védrine :

`mickael.vedrine@free.fr`

Cross sections of a cube	Season	2
	Episode	16
	Document	ICT task sheet

For this activity, you need to remember that *any three non-collinear points define a plane.* We will use this property to build various kinds of cross sections of a cube, with a java applet.
Log on to the computer and use the internet browser to load the page.

`http://www.mhhe.com/math/ltbmath/applets/ch9/index.html`

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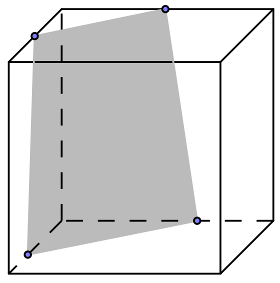
Correct or incorrect	Season	2
	Episode	16
	Document	Answer sheet

Below are reproduced 30 cross sections of a cube. Some them are correct, others aren't. Find out the incorrect ones and, in each case, explain why is it incorrect. You may name some points to do so. To get a bonus point, rectify the incorrect section to mek it correct.



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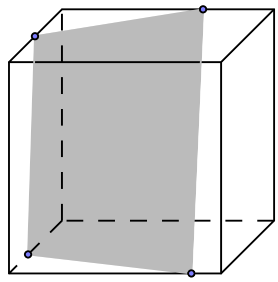

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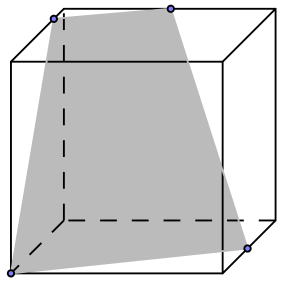

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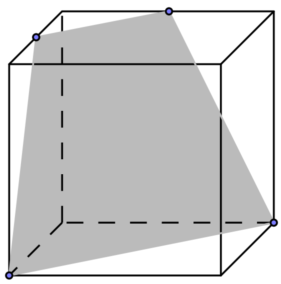

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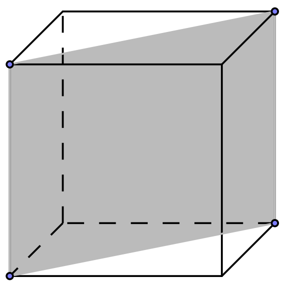

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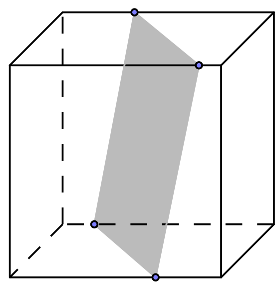

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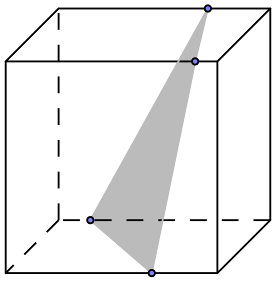

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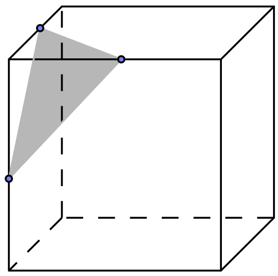

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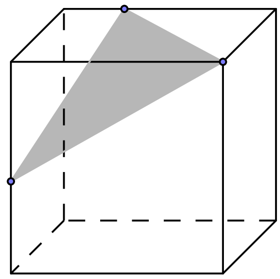

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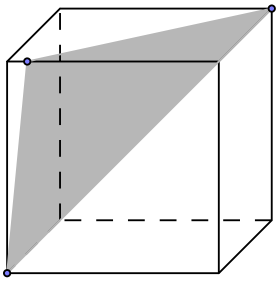

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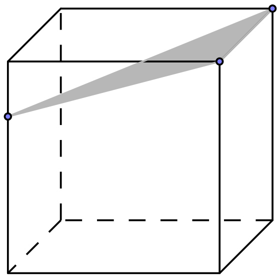

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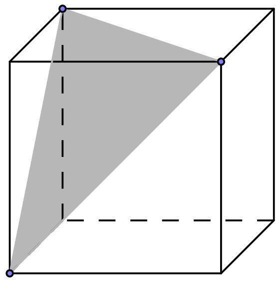

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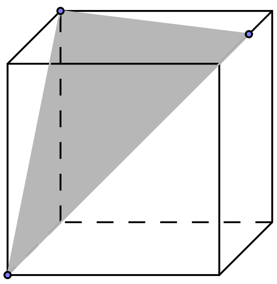

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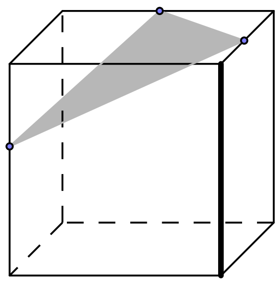

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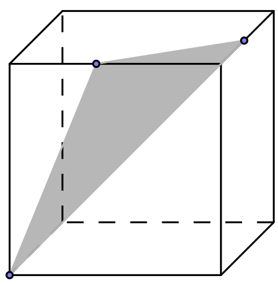

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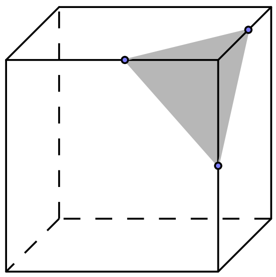

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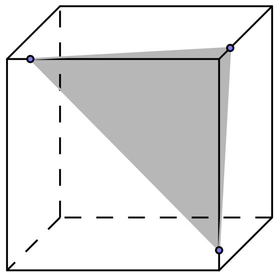

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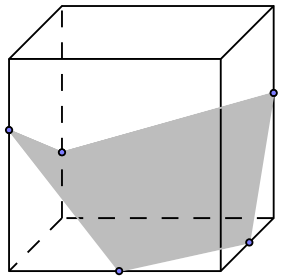

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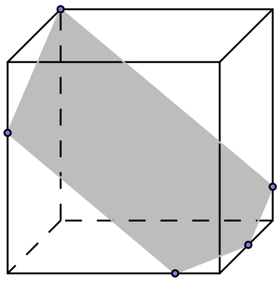

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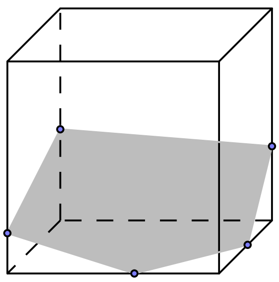

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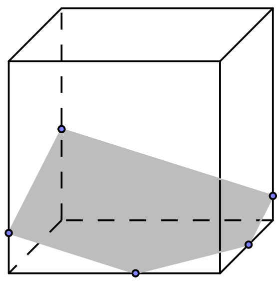

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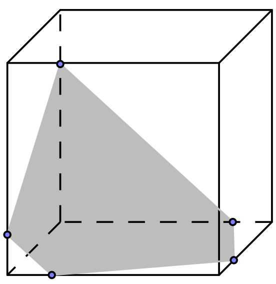

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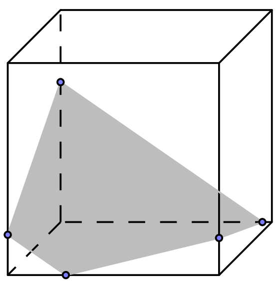

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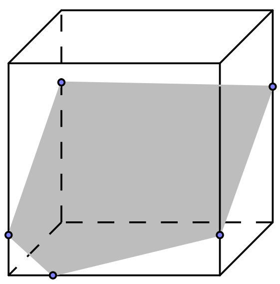

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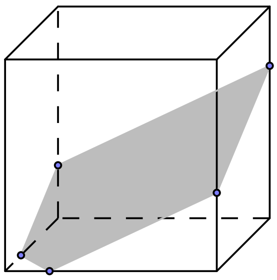

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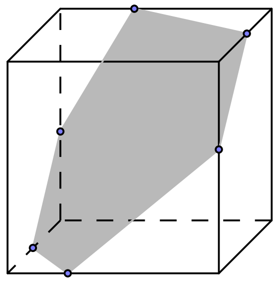

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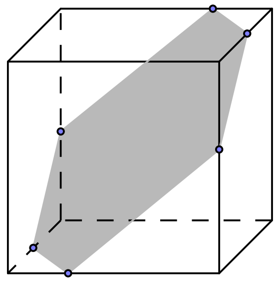

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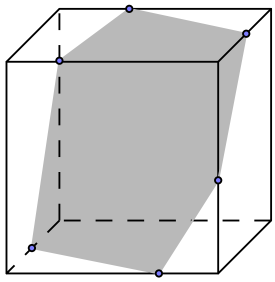

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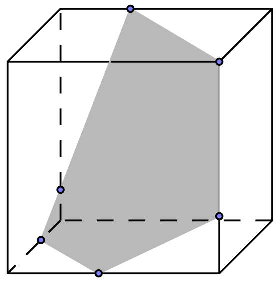

☐ Correct / Incorrect ☐

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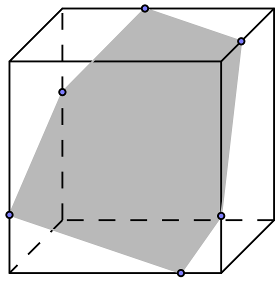

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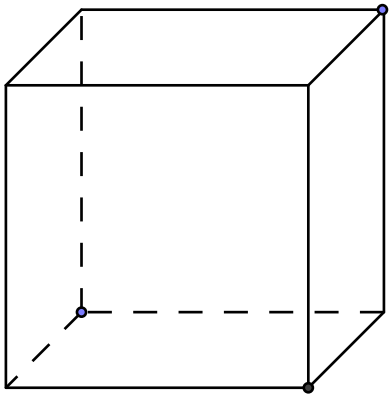
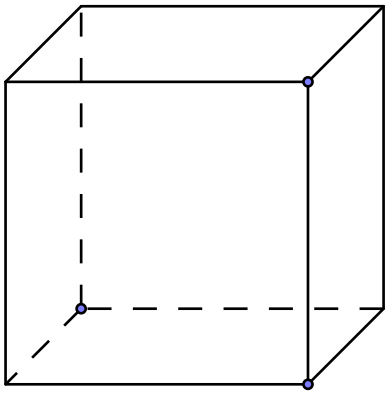
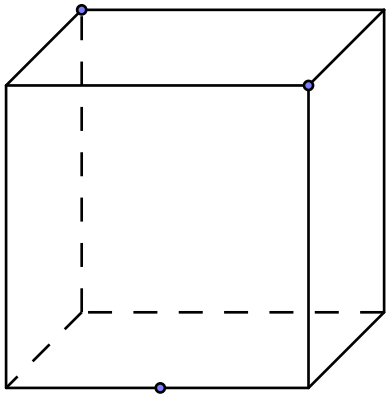
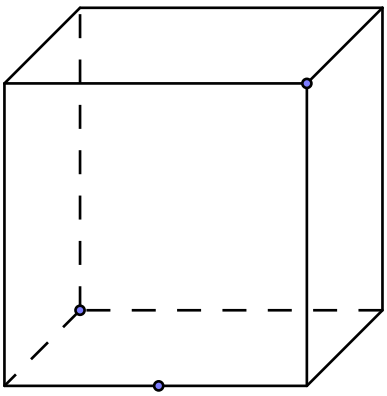
Cross sections of a cube	Season	2
	Episode	16
	Document	Exercises

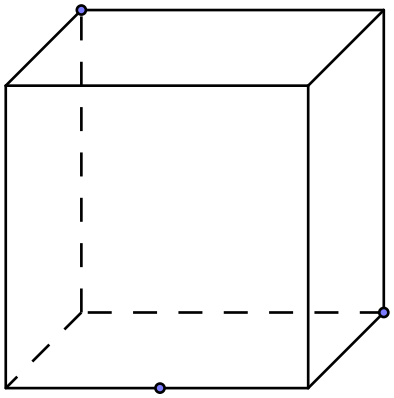
In each of the situations below, draw the cross section of the cube by the plane defined by the three points.

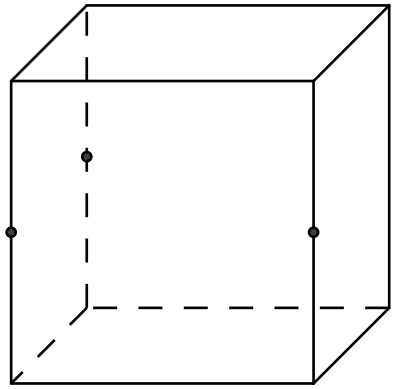


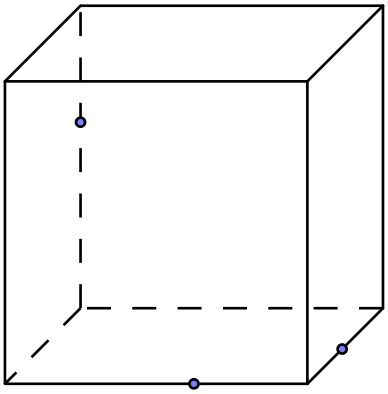


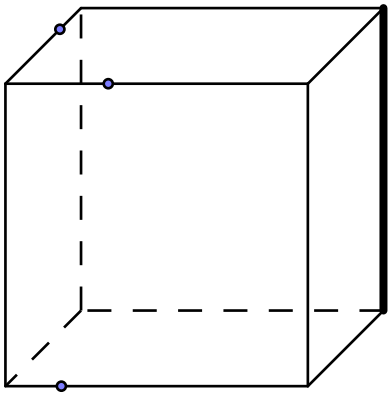


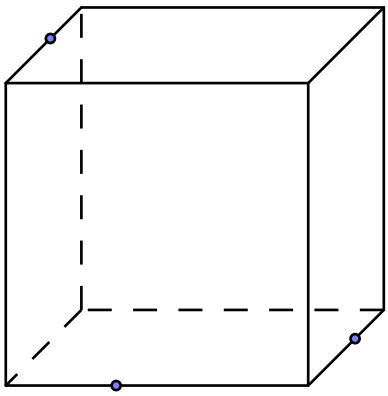


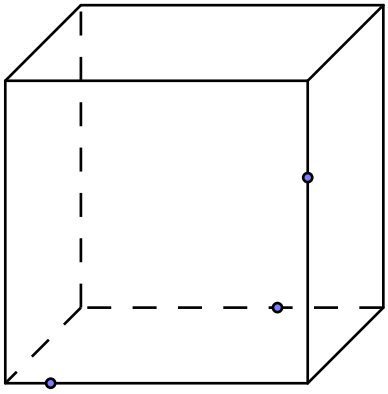












Cross sections of a cube	Season	2
	Episode	16
	Document	Rules

Rule 1 : You can join two points of the section if they are on the same face.

Rule 2 : When a line of the section plane is in a face, and a third point is on a face with an edge in common, you can draw the intersection of the line with the common edge.

Rule 3 : When a line of the section plane is in a face, you can build its intersection with an edge of the face.

Rule 4 : When a line of the section plane is in a face and a point of the section plane is on a parallel face, you can draw the parallel to the line passing through that point.

Cross sections of a cube	Season	2
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