

Cube Net or Not Cards:

Standards:

6.G.4 Represent three dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

Directions for Students:

Work with your partner. Take turns choosing a card.

Decide whether the net on the card determines a cube. Convince your partner of your decision. If you don't agree with your partner, explain why. You are both responsible for each other's learning.

If you both agree, glue the card on your poster. Next to the card, write reasons to support your decision.

Put to one side any cards which you are unsure about.

You may want to have some large grid paper available for students to test those cards about which they are unsure. Do not allow students to use the grid paper until they have completed a preliminary sort on the cards.

Once students have gotten as far as they can, give the following directions:

Once you have gotten as far as you can, one partner may visit other groups and ask questions about their cards. The partner remaining will answer the questions of other groups as they visit.

If you have any changes in your previous thoughts, make them.

Distribute Question set and ask students to work with their partner to answer them. After students have spent 10 to 15 minutes answering questions, allow students to share their ideas in a class discussion. Encourage students to add to or clarify any statements which are made.

Show students the slide of a square pyramid and tetrahedron. Ask students to use their previous knowledge of nets to complete the next card sort.

Directions for Students:

Work with your partner. Take turns choosing a card.

Decide whether the net on the card determines a square pyramid, a tetrahedron, or neither. Convince your partner of your decision. If you don't agree with your partner, explain why. You are both responsible for each other's learning.

If you both agree, glue the card on your poster. Next to the card, write reasons to support your decision. Be sure to organize your poster in a way which is easy to read.

Put to one side any cards which you are unsure about.

Once students have gotten as far as they can, give the following directions:

Once you have gotten as far as you can, one partner may visit other groups and ask questions about their cards. The partner remaining will answer the questions of other groups as they visit.

If you have any changes in your previous thoughts, make them.

Discuss the findings as a class.

What strategies did you use to help you make decisions?

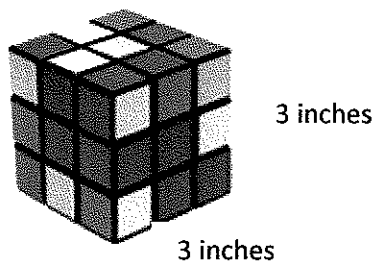
What are some important things to consider when determining if a net forms a solid or not?

A net is a flat diagram which can be folded to form a three dimensional figure.

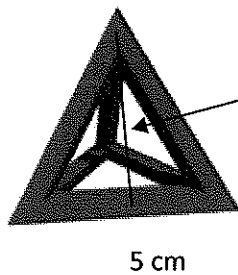
Surface area is the sum of the areas of the surfaces of a three dimensional figure. Sometimes it is helpful to consider the net of a three dimensional figure when determining its surface area.

Find the surface area of the following figures:

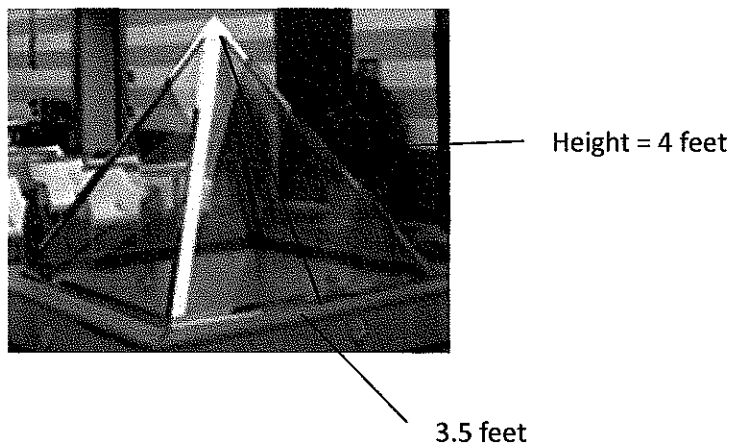
A cube:



A tetrahedron:



A square pyramid:

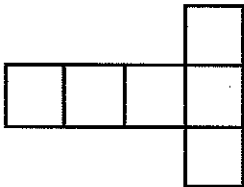


Cube: Net or Not?

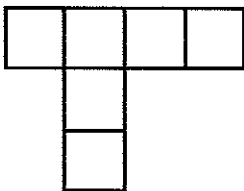
E1



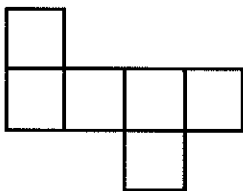
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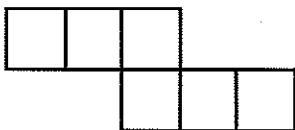
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E4



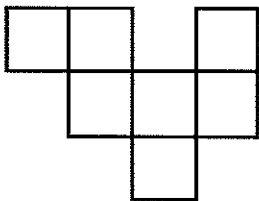
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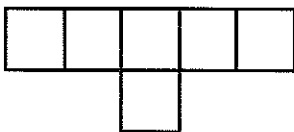
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E7



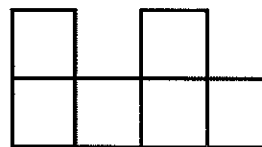
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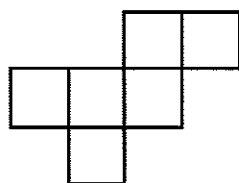
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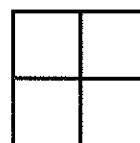
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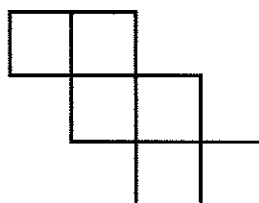
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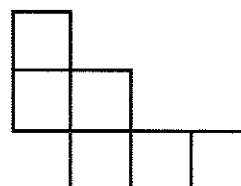
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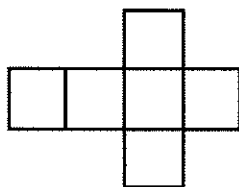
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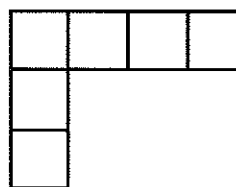
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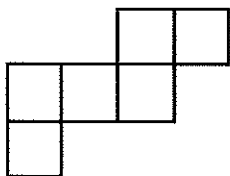
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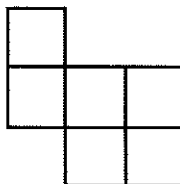
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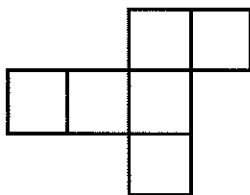
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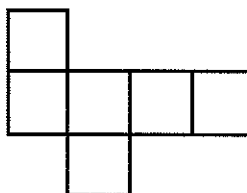
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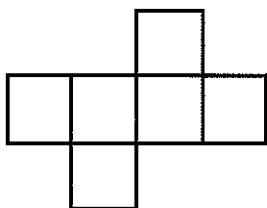
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E20



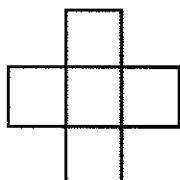
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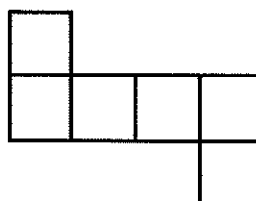
E22



E23



E24



Student Questions

1. What properties are common to all nets that will form a cube?

2. What type of nets will not work? Why not?

3. Without folding, is there a quick way to determine whether or not a net will fold into a cube?

4. How can you determine if two nets are identical?

5. What sort of properties does your final cube have? How do these compare to the properties of the nets?

Solutions

Nets: E2, E4, E5, E11, E13, E15, E17, E19, E20, E21, E24

Not: E1, E3, E6, E7, E8, E9, E10, E12, E14, E16, E18, E22, E23

Questions

1. What properties are common to all nets that will form a cube?

[All acceptable nets have six squares and 14 sides.]

2. What type of nets will not work? Why not?

[Nets with more or fewer than six squares will not work. In addition, many nets with six squares cause two squares to overlap. Obvious cases of this are when four squares share a vertex; when two squares lie on the same side of a center row of squares; and when more than four squares occur in a row.]

3. Without folding, is there a quick way to determine whether or not a net will fold into a cube?

[If a net suffers from any of the problems noted above, it will not form a cube, and these problems can be determined by visual inspection.]

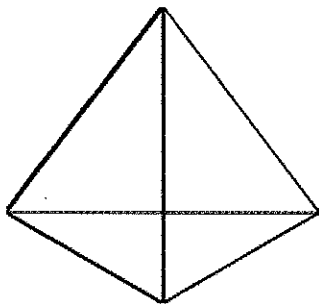
4. How can you determine if two nets are identical?

[One of the nets will fit exactly on top of another net when flipped or rotated.]

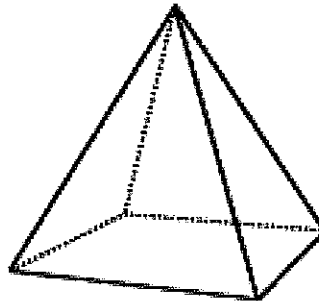
5. What sort of properties does your final cube have? How do these compare to the properties of the nets?

[The surface area of the cube is equal to the area of the net. The cube has 12 edges, while each net has 14 sides.]

Tetrahedron

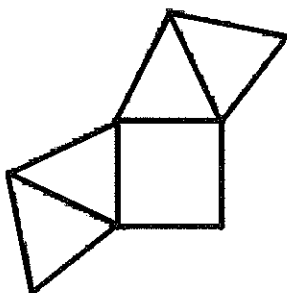


Square pyramid

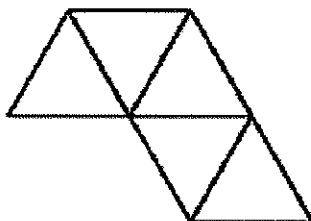


Square Pyramid, Tetrahedron or Neither?

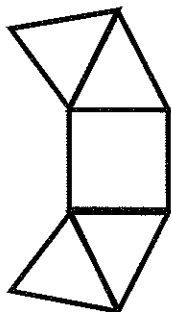
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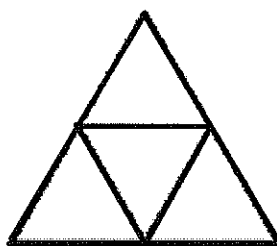
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E3



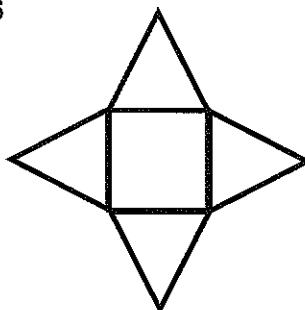
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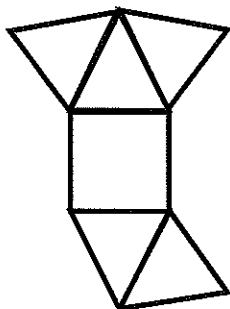
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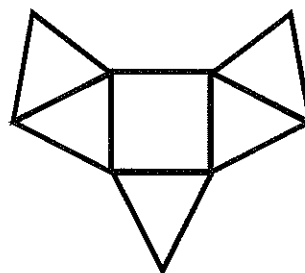
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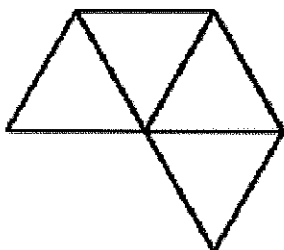
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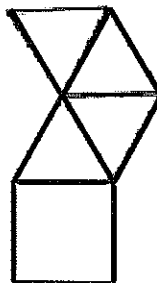
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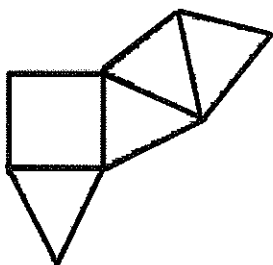
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E10



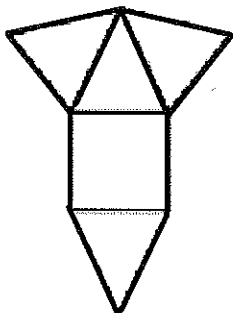
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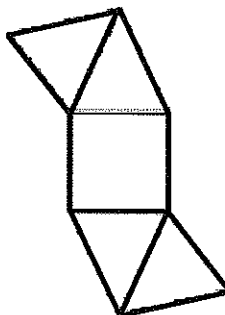
E12



E13



E14



E15

E16