CHAPTER

26

Lines, Angles and Triangles

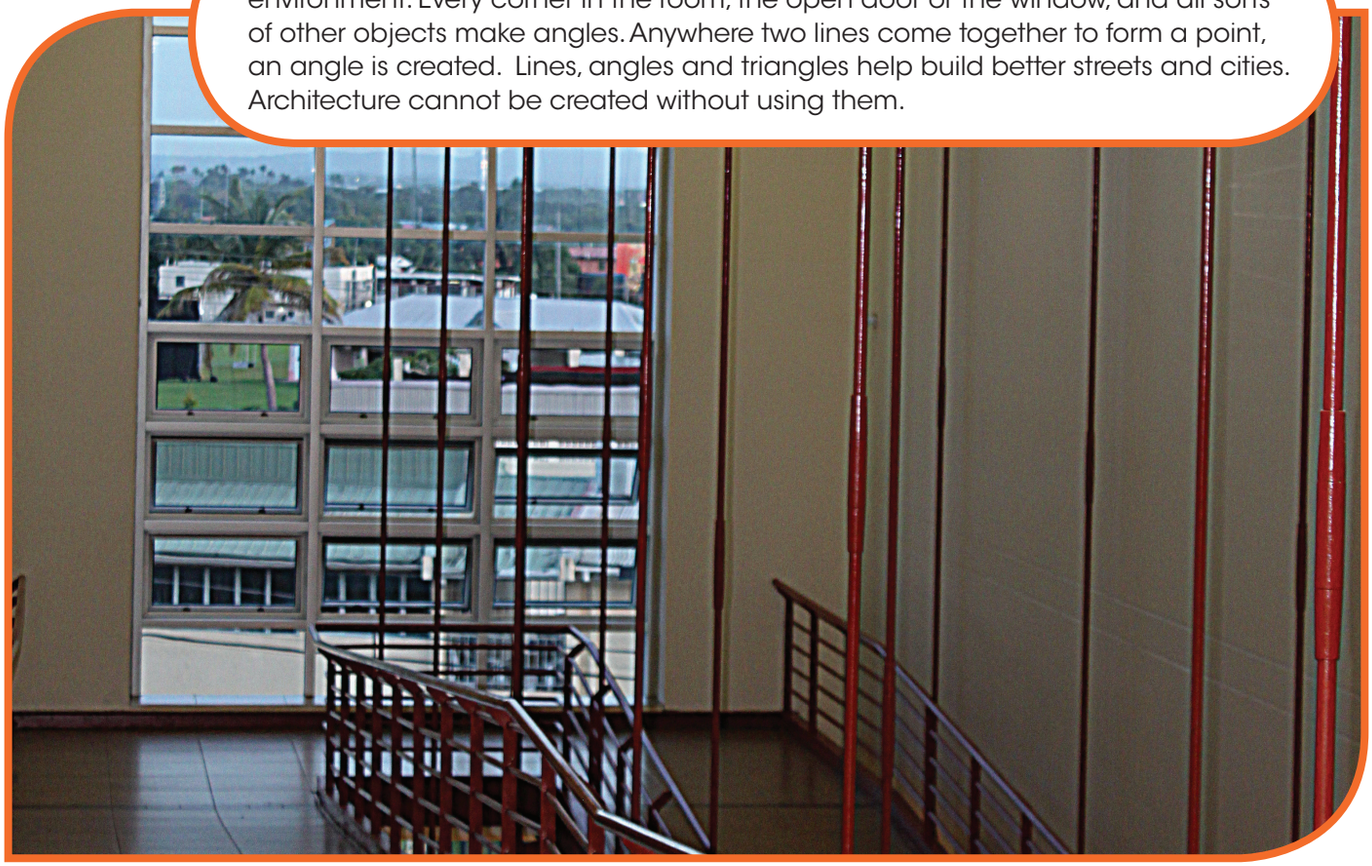
Vocabulary:

point
line
endpoint
line segment
parallel line
perpendicular line
intersecting lines
angle
whole turn
rotation
quarter turn
half turn
three quarter turn
clockwise
right angle
isosceles triangle
equilateral triangle
scalene triangle

Chapter Outcomes:

- Demonstrate an understanding of the properties of solids and plane shapes.
- Demonstrate an understanding of angles.
- Demonstrate an understanding of the different types of triangles based on properties of sides and angles.

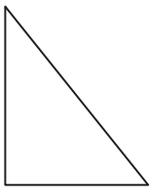
Take note of the curves, angles, lines and other aspects which create your environment. Every corner in the room, the open door or the window, and all sorts of other objects make angles. Anywhere two lines come together to form a point, an angle is created. Lines, angles and triangles help build better streets and cities. Architecture cannot be created without using them.



Getting Ready for Chapter 26

Write the number of sides and vertices.

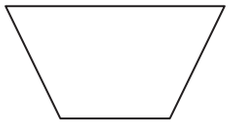
1.



___ sides

___ vertices

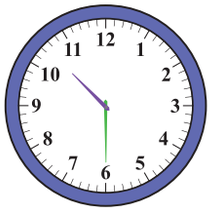
2.



___ sides

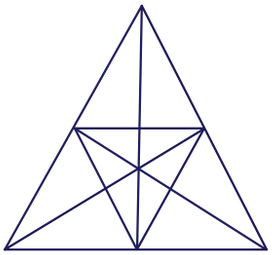
___ vertices

3. Tell the time on the clock.



4. Which are parts of lines and which are not?

5. How many triangles can you count?



Lines

Teaching Point 1:

What is important to know about lines?

● **point**	A **point** is the exact position that is represented by a dot.
⟷ **line**	A **line** is a straight set of points that extends in opposite directions without ending.
end point — **line segment**	A **line segment** is a part of a line with two endpoints.

Activity 1:

Write a name for each.

1.

2.

3.

Draw and label a picture of each.

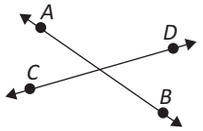
4. line

5. point

6. line segment

Teaching Point 2:

How can you identify and draw parallel lines and perpendicular lines?



intersecting lines

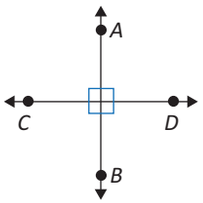
Intersecting lines are lines that meet and cross each other.

line ***AB*** intersects line ***CD***.

parallel lines

Parallel lines are always the same distance apart. They **do not** meet and cross each other.

line ***AB*** is parallel to line ***CD***.



perpendicular lines

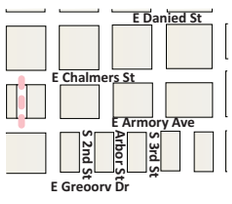
Perpendicular lines meet or cross each other to form **square corners.**

line ***AB*** is perpendicular to line ***CD***.

Activity 2:

Identify the perpendicular lines and parallel lines in the objects below.

1. 

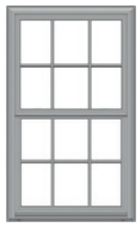
2. 

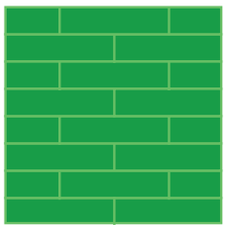
3. 

4. 

5. 

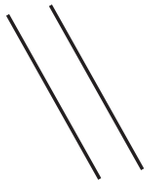
6. 

7. 

8. 

Activity 3:

Tick the pairs of lines that appear to be parallel.

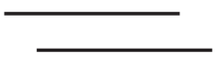
1. 

2. 

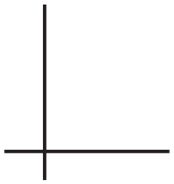
3. 

4. 

5. 

6. 

Tick the pairs of lines appear to be perpendicular.

7. 	8. 
9. 	10. 
11. 	12. 

Activity 4:

Copy each line. Draw a line that is perpendicular to each given line.

1.

2.

3. 

Copy each line. Draw a line that is parallel to each given line.

4. 

5.

6. 

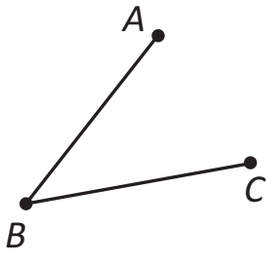
Angles

Teaching Point 1:

How can you identify angles?

An **angle** is formed when two line segments share the same endpoint.

The shared endpoint is called the **vertex**.



angle

You can name an angle by its vertex.

You can also name an angle using the three endpoints with the vertex point in the middle.

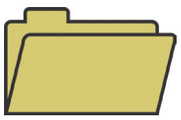
angle ***B*** or angle ***ABC***

In a plane shape two sides meet at a corner to form an angle.

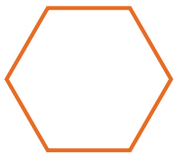
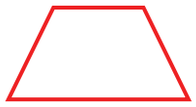
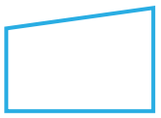
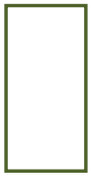
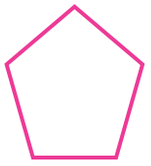
Activity 1:

Find angles in the objects below.

1. 	2. 

3. 	4. 
5. 	6. 
7. 	8. 

Copy each shape. Find the number of angles in each shape.

9. 	10. 
11. 	12. 
13. 	14. 
15. 	16. 

Teaching Point 2:

How can you identify angles?

An angle measures the **amount of turn**.

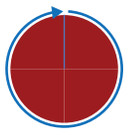
Two interlocking blue and red circles measure the amount of turn. As the red circle rotates **clockwise**, it moves from no turn through a whole turn.

no turn

$\frac{1}{4}$ **turn** clockwise

$\frac{1}{2}$ **turn** clockwise

$\frac{3}{4}$ **turn** clockwise



1 whole turn clockwise

Clockwise is the same direction as the hands of a clock.

Anti-clockwise is the direction opposite from the way the hands move on a clock.

Activity 2:

Use real objects. Describe the amount of turn each object can make.

1. 	2. 

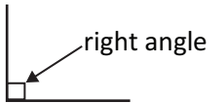
3. 

4. 

Teaching Point 3:

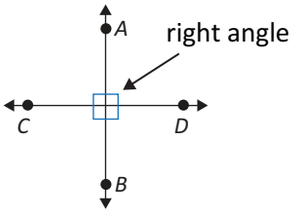
How can you identify right angles?

$\frac{1}{4}$ **turn** is also called a **right angle**



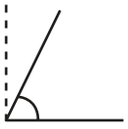
A square is drawn in the corner of the angle to show that it is a right angle.

Right angles are formed when two perpendicular lines meet or cross each other.

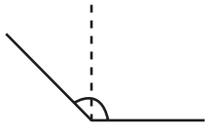


A right angle forms a square corner.

A **right angle**



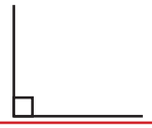
Less than a right angle



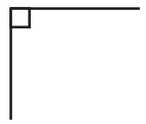
Greater than a right angle

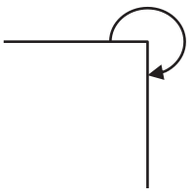
Activity 3:

Draw each angle. Use $\frac{1}{4}$ turn, $\frac{1}{2}$ turn or $\frac{3}{4}$ turn to label each angle.

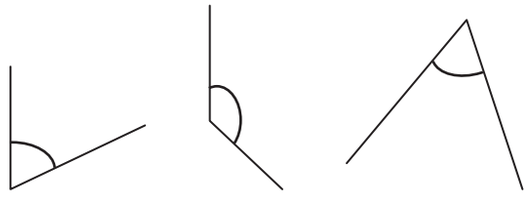
1. 

2. 

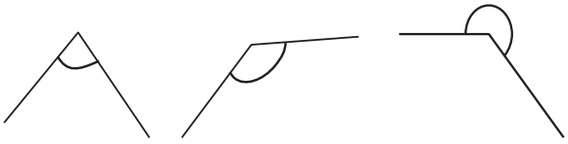
3. 

4. 

5. Which of these angles are less than a right angle?

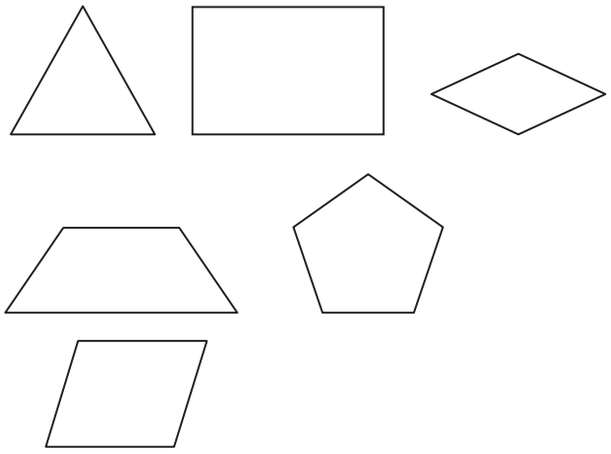


6. Which of these angles are more than a half turn.

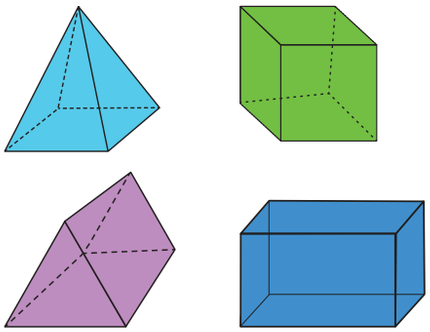


Activity 4:

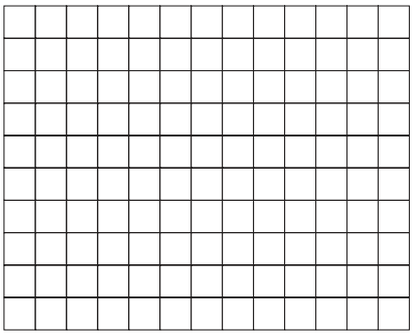
1. Describe the angles in each plane shape as right angles, greater than right angles or smaller than right angles.



2. Describe the angles on the faces of each solid as right angles, greater than right angles or smaller than right angles.



Use a grid like the one below to complete numbers 3 to 5.

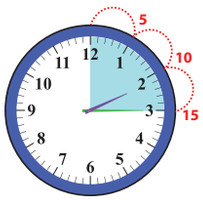


3. Draw a plane shape that has four right angles on the grid below.
4. Draw a plane shape that has one of its angle greater than a right angle.
5. Draw a plane shape that has an three angles that are smaller than a right angle.

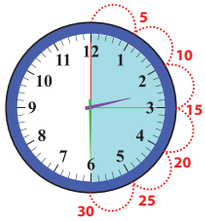
Teaching Point 4:

How can we use clocks to show angles?

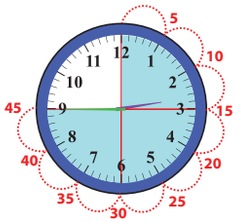
A clock can represent angles.



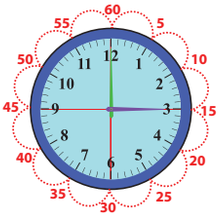
15 minutes = $\frac{1}{4}$ turn



30 minutes = $\frac{1}{2}$ turn



45 minutes = $\frac{3}{4}$ turn



60 minutes = 1 turn

Each 5 minutes represents $\frac{1}{12}$ turn.

Activity 5:

Solve.

1. Susan watched a game from 1 p.m. to 1:30 p.m. Describe the turn the minute hand made.

2. Carrie does her homework from 4 p.m. to 4:45 p.m. What is the amount of turn the minute hand made?

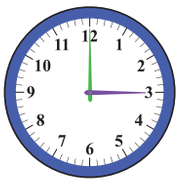
3. On a clock face what angle is formed by the two hands of the clock when it is 6 o'clock?

4. Jenny's snack time is 15 minutes each day. Which fraction describes the turn of the minute hand on the clock face after Jenny has her snack?

5. Samara began reading at 7:45 p.m. and finished reading when the minute hand had made a half turn.

At what time did Samara finish reading?

6. In the diagram below, the shorter hand is pointing to the number 3.



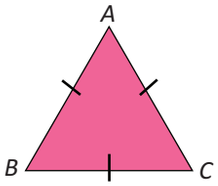
The shorter hand makes a quarter turn. To which number is it now pointing?

7. The long hand on the clock makes a complete turn. What time is it now?

Classify Triangles

Teaching Point 1:

How can you classify triangles by the length of their sides?

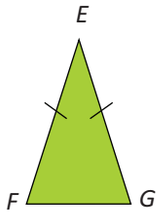


equilateral triangle

In triangle ***ABC***, all the sides are of **equal lengths**.

Sides AB = BC = AC

ABC is an **equilateral triangle**.

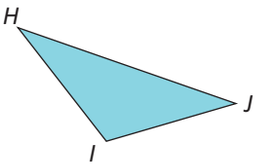


isosceles triangle

In triangle ***EFG***, two sides are of **equal lengths.**

Sides EF = EG

EFG is an **isosceles triangle**.



scalene triangle

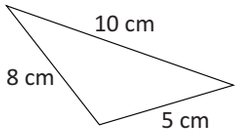
In triangle ***HIJ***, all the sides have **different lengths**.

HIJ is a **scalene triangle**.

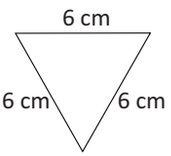
Activity 1:

Classify each triangle. Write isosceles, equilateral or scalene.

1.



2.



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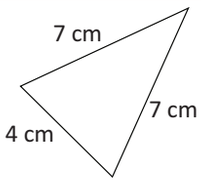
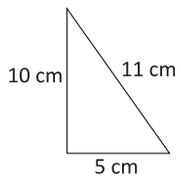


4.



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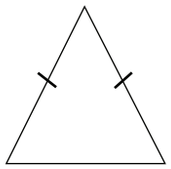

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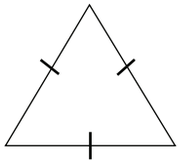
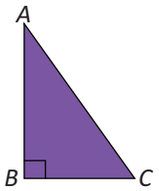


Teaching Point 1:

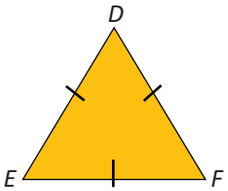
How can you classify triangles by the size of their angles?



right-angled triangle

In triangle ***ABC***, angle ***B*** is a right angle.

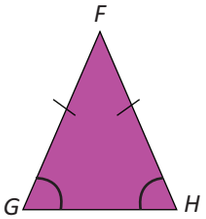
Δ***ABC*** is a **right-angled triangle**.



equilateral triangle

Equilateral triangle *DEF*, has **3 equal sides** and **3 equal angles**.

Each of its angles are smaller than a right angle.



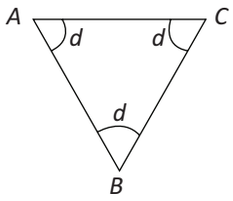
isosceles triangle

Isosceles triangle *FGH*, has **2 equal sides** and **2 equal angles**.

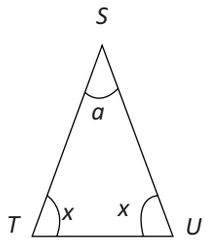
Activity 2:

Classify each triangle. Write isosceles, equilateral or right-angled.

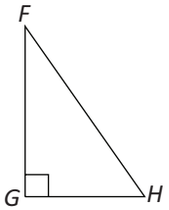
1. Triangle *ABC* has ONLY equal angles.



2. Triangle *STU* has 2 equal angles.



3. Triangle *FGH*.



4. Draw an example of an isosceles triangle.

5. Draw an example of a right-angled scalene triangle.

6. Draw an example of an equilateral triangle.

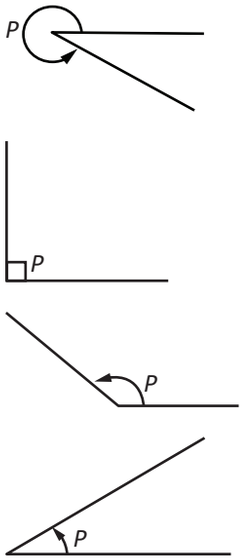
Chapter Review

Answer the questions.

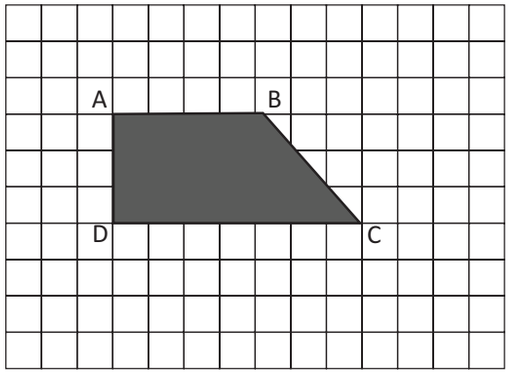
1. Draw a scalene triangle.

2. What angle is formed when two perpendicular lines meet?

3. Which of the following angles marked *p* is greater than a right angle?



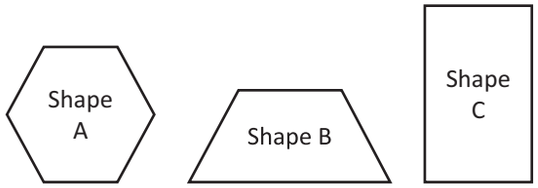
4. The following diagram shows a plane shaded shape ABCD.



On the diagram ABCD, tick (✓) the two sides which are parallel to each other.

5. An equilateral triangle has a perimeter of 90 cm. How long is each side?

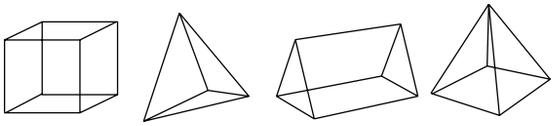
6. Use the plane shapes below to complete each statement.



(a) All of Shape _____ angles are right angles.

(b) Each of Shape _____ interior angles are greater than right angles.

7. Four solids are shown below.

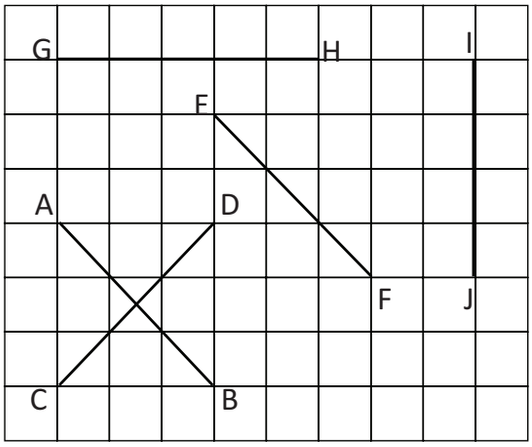


(a) Which solid has NO right angles on any of its faces.

(b) Which solid has ONLY right angles on each of its faces?

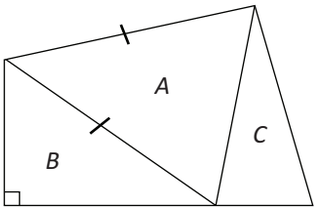
(c) How many right angles are on the faces of the triangular prism?

8. The diagram below shows five lines, AB, CD, EF, GH and IJ.



Which of the lines is PARALLEL to AB?

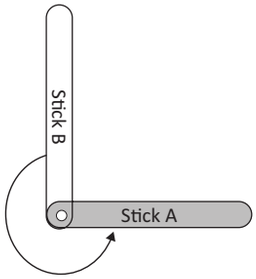
9. The figure below is made up of three triangles. Triangle A has two equal sides. Complete the statements.



Triangle _____ has two equal angles.

Triangle _____ is a right-angled triangle.

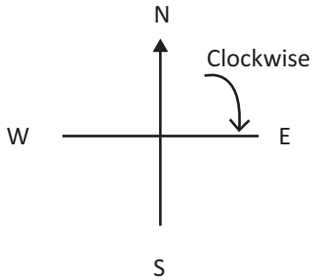
10. Adesh rotated two palette sticks as shown below.



(a) In what direction did he rotate Stick A?

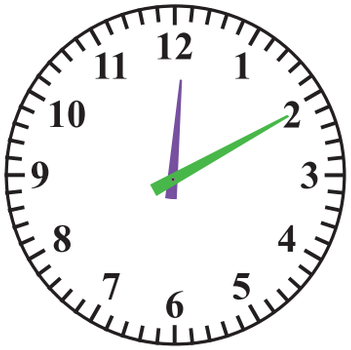
(b) Describe the amount of turn that Stick A made.

11. Vitali is facing West and makes THREE $\frac{1}{4}$ turns in a clockwise direction.



In which direction will Vitali now be facing?

12. The minute hand on the clock below is on 2.



It moves to 8. What is the amount of turn the minute hand made?

13. In the diagram Andell is standing at point O facing the post office. Which place will he be facing if he makes a $\frac{1}{4}$ of a complete turn anti-clockwise?