Helping With Math

Spatial Skill:
Lines, Segments, and Rays

Suitable for students
aged 8-11

December 3:
International Day of PWDs

This pack is suitable for learners aged 8-11 years old or 4th to 6th graders. The content covers fact files and relevant basic and advanced activities of lines, segments, and rays topics that aim to develop and strengthen the learners' spatial skills.

- The United Nations (UN) General Assembly Resolution 47/3 led the proclamation of the yearly observance of International Day of Persons with Disability in 1992.
- The objective of this observance is to advocate the rights and well-being of persons with disabilities all over the world.
- It also aims to heighten the awareness of the world regarding the situation of the PWDs in every aspect of political, social, economic, and cultural life.
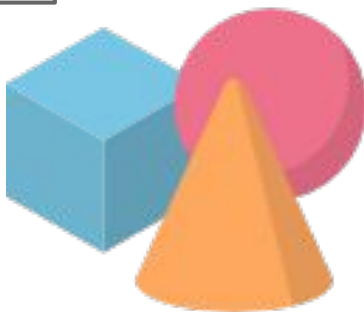
SPATIAL SKILL

Spatial skill is the ability to comprehend, reason, and recall spatial relations among objects or space.
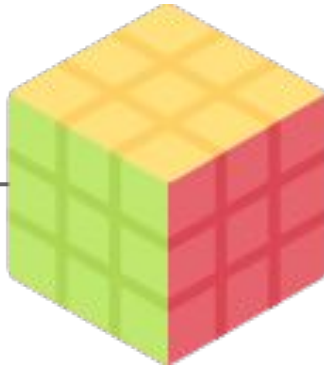
There are four types of spatial skills: spatial perception, spatial visualization, mental folding and mental rotation.

According to experts, children use geometrical strategies to solve math problems, some includes mental number lines, geometric figures, and information about locations in space.

SPATIAL SKILL

Experts also concluded that people who use spatial representation (including spatial relationships) in dealing with math problems are more likely to get better scores.

- Children who have displayed better spatial skills when compared to their peers have better academic achievement in math.
- How do we develop the spatial skills of young learners? Researchers suggest that children must play with building blocks, puzzles, video games, and other spatial materials to help develop their spatial skills.

Which among these items do you play and enjoy the most? Why? Share your answer below.

LINES

A   *(Line AB or $\overline{AB}$)*   B
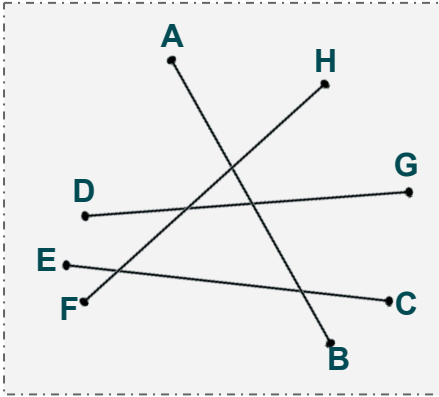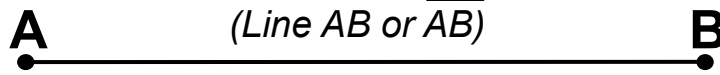
How many lines do you see at the image on the left? Can you name them all?

In geometry, a line is defined as a group of two or more points. It is a straight line with no bends. Line has no thickness and it extends infinitely in both directions.
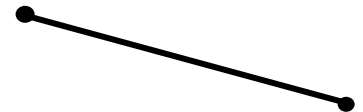
We can name lines using two uppercase letters like line AB, line CE, etc.

Ray   line   Line segment

We all love our family, right?
Like us, a line has its own family and they are called as **subsets of line**.
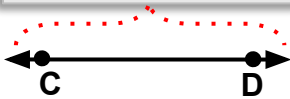
Now, I will introduce them to you!

LINES

SUBSETS OF A LINE

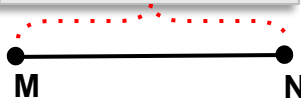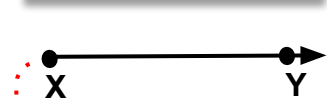| LINE	LINE SEGMENT	RAY
• It extends infinitely to opposite directions. • It has two arrowheads on opposite ends.	• It has no endpoints. • It has definite length • It is usually used to indicate measurement such as length, width, height and distance.	• It has one endpoint and an arrowhead on the other end. • It is usually used to represent an action from a starting position towards another.

two arrowheads

two endpoints

one arrowhead

C   D

M   N

X   Y

one endpoint

We use different symbols to name a line, line segment and ray. These symbols are drawn above the two letters that represents points on each subset of line.

$$\overleftrightarrow{CD} \qquad \overline{MN} \qquad \overrightarrow{XY}$$

A   H

D   G

E

F   C

B
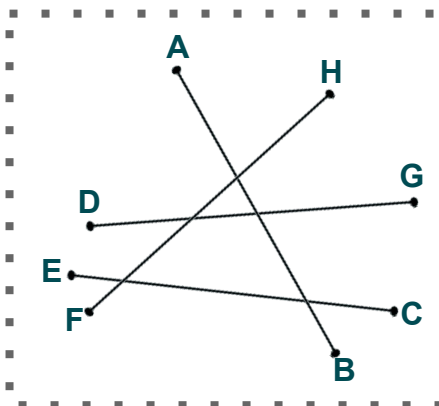
How many points are in there?	
How many lines are in there?	

| Can you name all the points?	
Can you name all the lines?	

LINES

A **line** is a one-dimensional figure, which has length but no width. It is composed of two or more points. In geometry, line can be classified into sub-groups. One of which is that lines can be parallel or perpendicular.
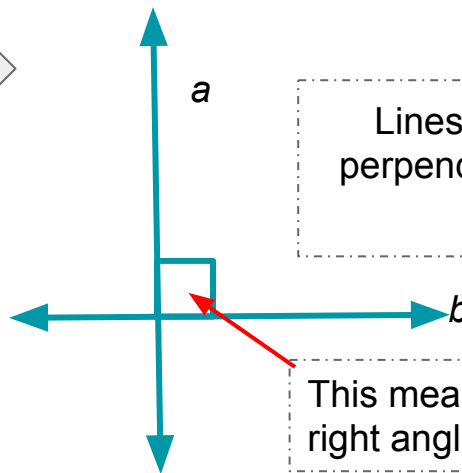
PARALLEL LINES

Lines are said to be parallel if they are always the same distance apart (called "equidistant"), and will never meet or intersect.

a

b
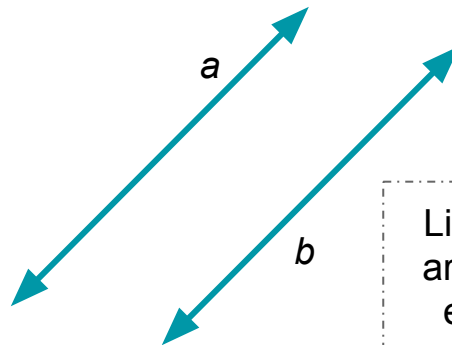
Lines *a* and *b* are parallel to each other.

PERPENDICULAR LINES

Lines are perpendicular to each other if their intersection produces a 90-degree angle.

a

Lines *a* and *b* are perpendicular to each other.

b

This measures 90°. It is a right angle.

TABLE OF ACTIVITIES

	Ages 8-10 (Basic)	G4 - G5
1	The PWD Line	
2	The Wheelchair's Way	
3	Greg's Special Homework	
4	Greg's Spatial Task	
5	The PWD House	
	Ages 9-11 (Advanced)	G5-G6
6	The Parallel Task	
7	PWD Day Painting Contest	
8	Working in Silence	
9	Solving Perpendicular Lines	
10	The Line Battle	

As we celebrate the International Day of PWDs, put a check on the images that portray a line. These are images related to PWDs. Can you identify all of them correctly?
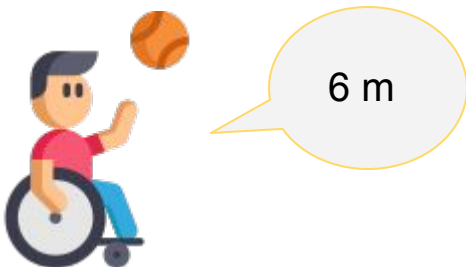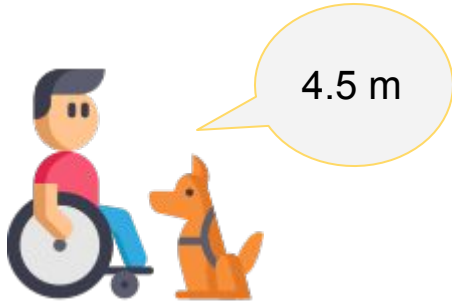
1.) ☐
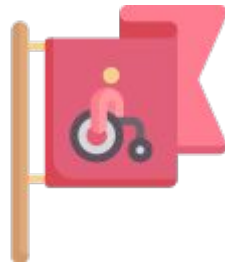
2.) ☐

3.) ☐
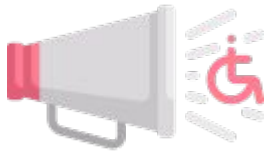
4.) ☐

5.) ☐

6.) ☐

Essay Question: What makes you think that the images that you checked represent lines in real life?

_____

_____

_____

_____

THE WHEELCHAIR'S WAY

Construct a line segment that corresponds to the distance of the wheelchair and its destination point. Note that every meter corresponds to a centimeter in scale drawing. Use a ruler for this activity.

4.5 m

3.75 m

6 m

6.15 m

GREG'S SPECIAL HOMEWORK

Greg is part of the PWD community. He is a hard working student. Today, Greg is asking for your help to count and name the lines that you see below. Use the space for your answer.
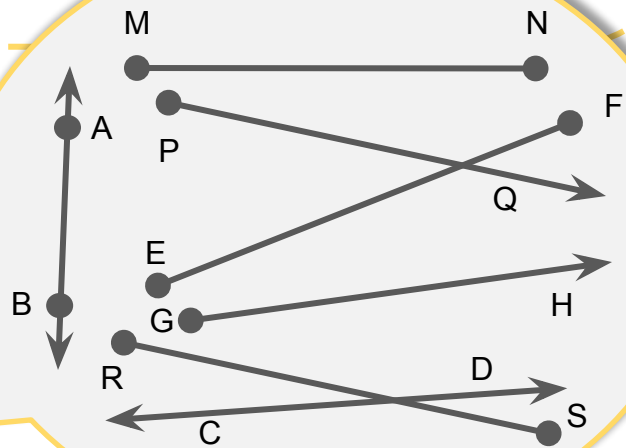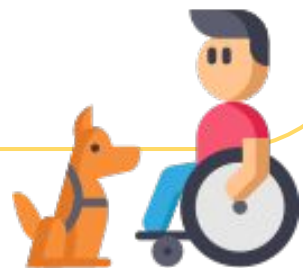
GREG'S SPATIAL TASK

Greg needs your help again. Work with him to draw a copy of each figure and find out how many lines were used to draw them. Write your answer on the space provided.
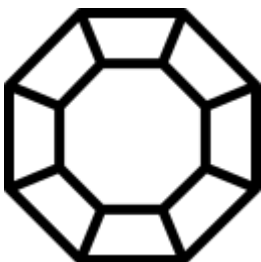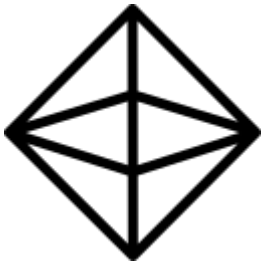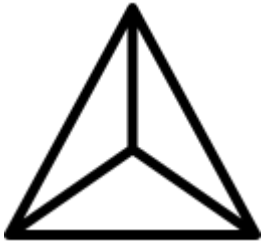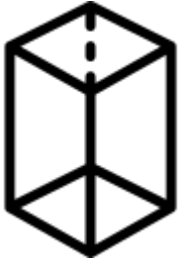
THE PWD HOUSE

Look at this PWD House made as a meeting place of the PWD Organization. Your task is to sketch the top view and front view of the house then count how many lines are used to draw it completely.
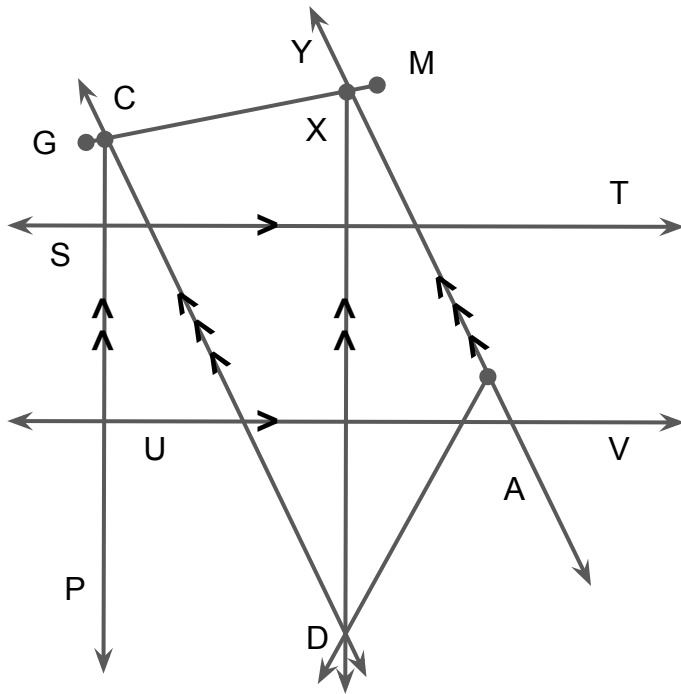

Top View	Front View

THE PARALLEL TASK

Help Mike to figure out the image below. Identify which among them are pairs of parallel lines. Write your answers on the space provided.

Can you identify and name the parallel lines that you see on the left? Write your answers below.

Write your answers here.

PWD DAY PAINTING CONTEST

Mike would like to participate on the PWD Day Painting contest. The mechanics of the event is given below. If you are Mike and you will be creating your masterpiece, how will it look like?

Look around you. Create a painting showing the different examples of parallel lines in life. What are the examples of parallel lines at your house? In the neighborhood? Show it below.

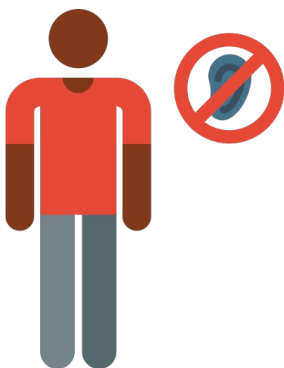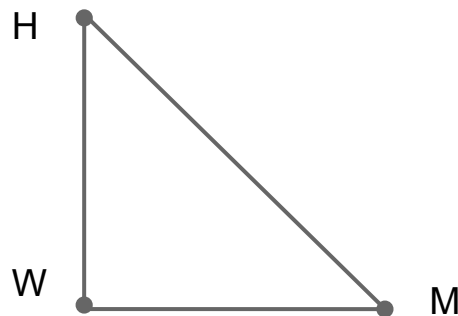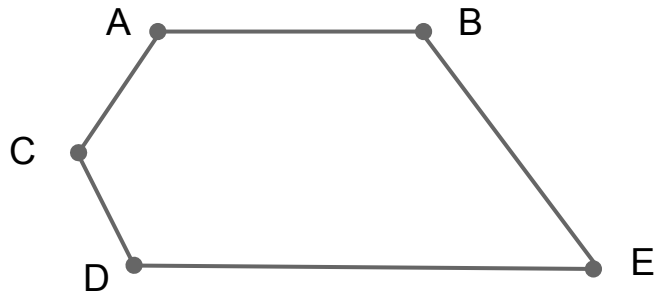**Klein is born with hearing disability but he is incredibly talented with sketching. In fact, he would like to be an engineer someday. One of the tasks of Klein is shown below. Help him to complete it.**

Using a ruler and pen, extend the sides of the given polygon then identify what type of lines (parallel, perpendicular, intersecting) are present.
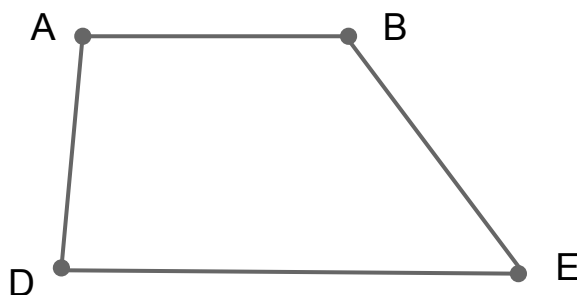
SOLVING PERPENDICULAR LINES

Celebrate inclusivity this International Day of PWDs by solving these perpendicular line-related questions. It would be best to draw the given to have a visual representation of the scenario.

1. Lines A and B are perpendicular lines. They intersect at Point C. What is the measurement of angle ACB?

2. Two lines intersect at one point. They created an angle which measures 90 degrees. Are the lines considered perpendicular? Why, or why not?

3. Lines X and Y are perpendicular lines. They meet at point Z. They created a right angle. Another line is drawn from point Z, it is now named WZ. Angle XZW measures 48 degrees. What is the measurement of the other angle formed?

4. Two lines intersect at one point. They created an angle which measures 100 degrees hear you it. Are the lines considered perpendicular? Why, or why not?
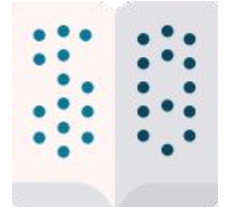
THE LINE BATTLE

G5-G6
Advanced

Promote accessibility for our beloved PWDs by answering the following essays below. Use the space for your answer.

1. What makes each type of line unique from each other?

2. What are parallel and perpendicular lines? Cite five examples of each in real life.

ANSWER GUIDE

Activity 1

The item numbers that represent line in real life are nos. 2, 3, 4, and 6.
Possible answer: These images are examples of line in real life have length.

Activity 2

The answers here can be checked using a ruler. Verify if the measurements are accurate.

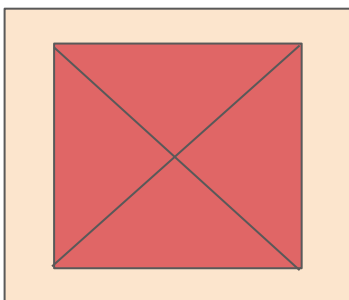## Activity 3

Line segment MN   Line AB   Ray PQ   Line segment EF
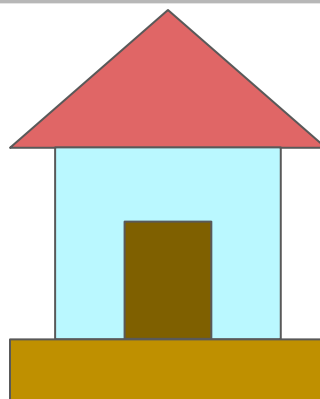Ray GH   Line segment RS   Line CD   There are 7 lines in all.

Activity 4

1. 12 lines   2. 7 lines   3. 12 lines   4. 24 lines

Activity 5

Top view

Front view

ANSWER GUIDE

Activity 6

The parallel lines are:
Line SP and line DX   Line ST and line UV Line CD and line AY

Activity 7

Answers may vary.

Activity 8

1. Parallel lines (AB and DE)
Intersecting lines CD and BE, AC and BE, AC and CD
2. Perpendicular lines - HW and WM, intersecting lines - HW and HM, MW and HM.
3. Parallel lines (AN and DE)
Intersecting lines are AD and BE.

Activity 9

1. 90 degrees
2. Yes, the lines actually possess the characteristics of perpendicular lines.
3. The measurement of the other angle is 42 degrees.
4. No, they are not perpendicular lines because for it to say a pair of perpendicular lines, they must form a 90-degree angle.

Activity 10

Answers may vary.

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- The Entire Helping With Math Team :)