

Class 3 Geometry: 几何

How to calculate Area

- ❖ Area of a Rectangle
- ❖ Area of a Square
- ❖ Area of Triangle
- ❖ Area of Parallelogram
- ❖ Area of Trapezoid
- ❖ Area of Circle
- ❖ Area of irregular shapes
- ❖ Area of Rectangular Triangle

Other important parameters about a shape

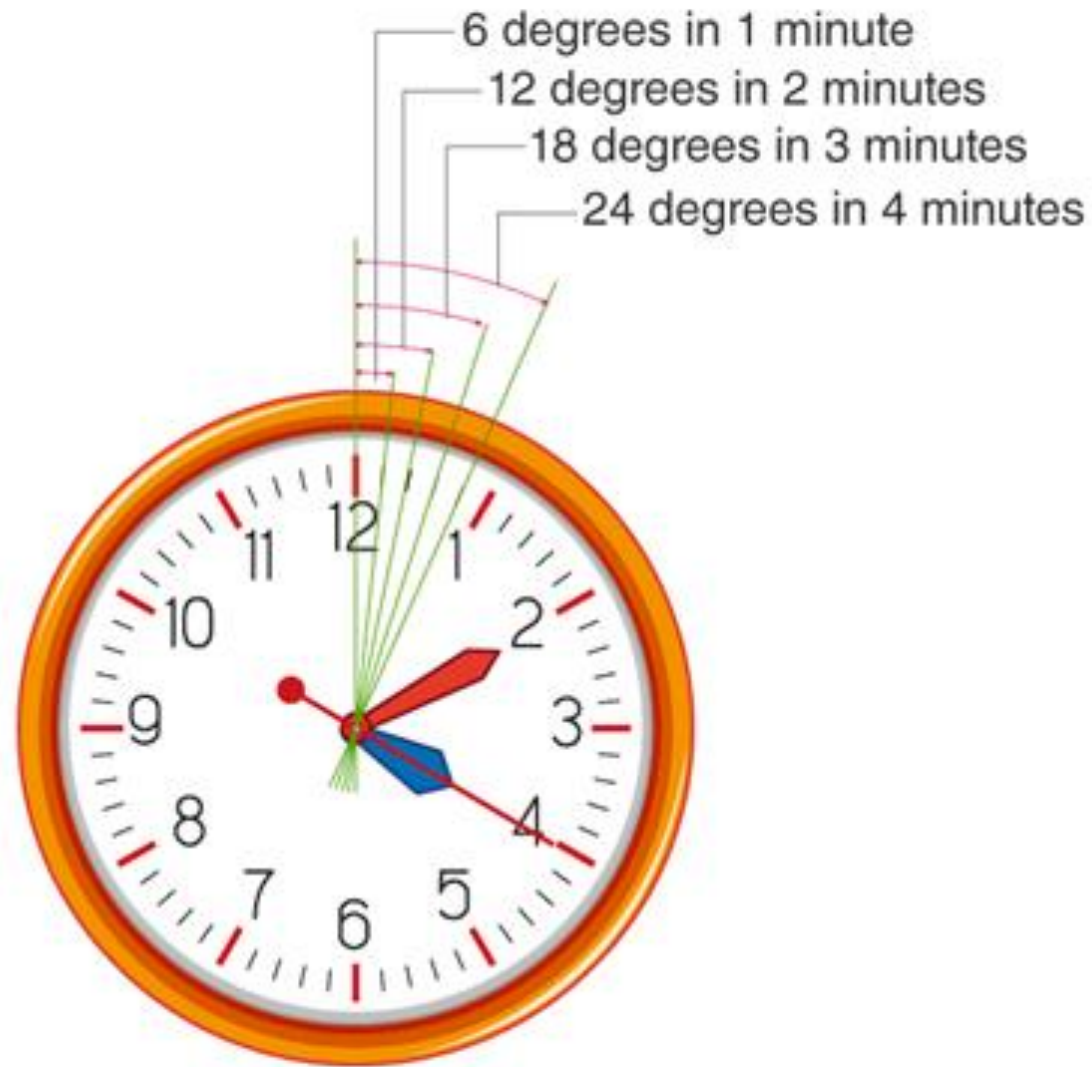
- ❖ A circle: radius, diameter, 360 degrees**
- ❖ A triangle:**
- ❖ A square**
- ❖ A parallelogram**
- ❖ A trapezoid**

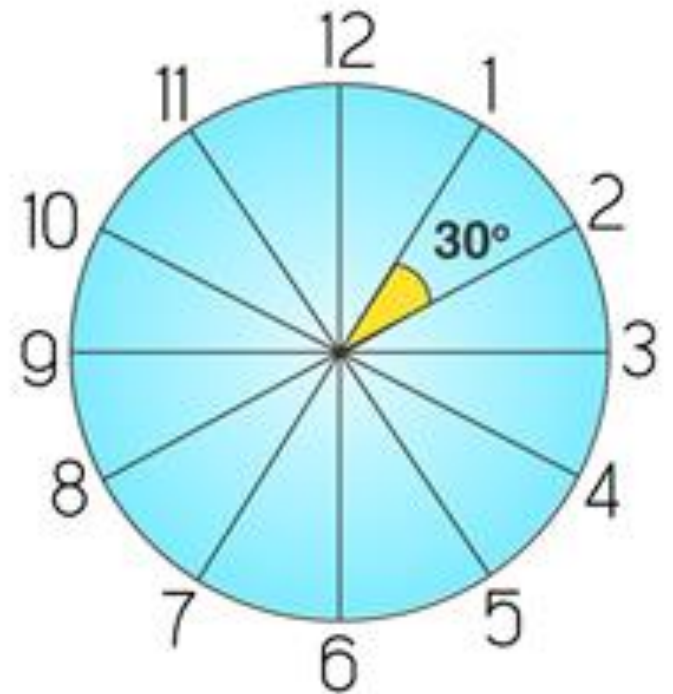
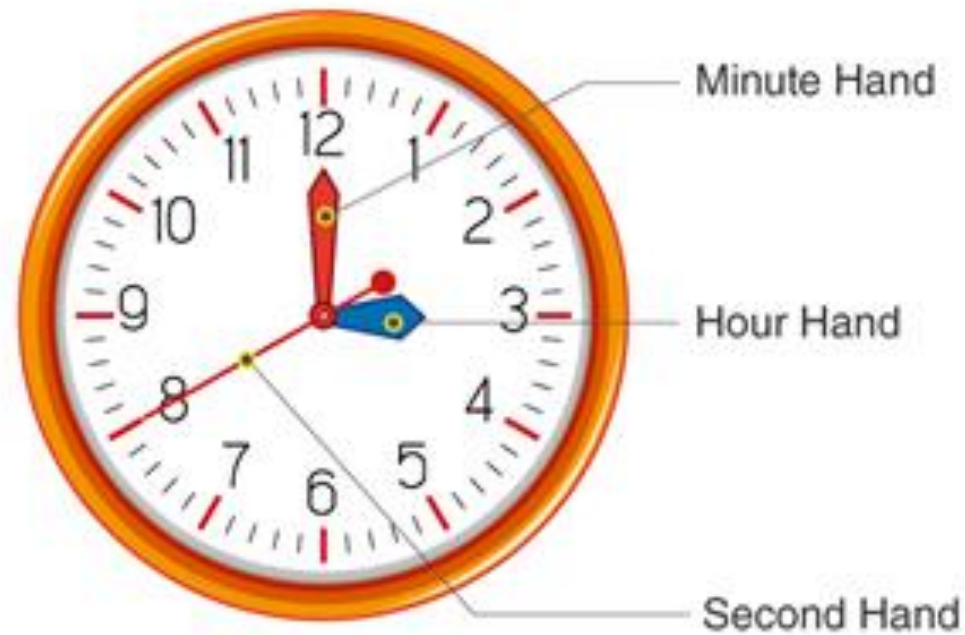
Today we focus on Circles

Circles

- ❖ Circle basics
- ❖ Arc measure
- ❖ Arc length (from degrees)
- ❖ Introduction to radians: one radian is the angle subtended at the centre of a circle by an arc that is equal in length to the radius.
- ❖ Arc length (from radians)
- ❖ Sectors
- ❖ Inscribed angles
- ❖ Inscribed shapes problem solving
- ❖ Properties of tangents
- ❖ Standard equation of a circle: $(x-h)^2+(y-k)^2=r^2$ where (h,k) is the center of the circle and r is the radius of the circle
- ❖ Expanded equation of a circle: not for Grades 4-6
- ❖ Constructing regular polygons inscribed in circles
- ❖ Constructing circumcircles & incircles
- ❖ Constructing a line tangent to a circle

Clock Problems





The angle between any two consecutive divisions = $(360^\circ)/12 = 30^\circ$

Speed of the hands

Speed = Distance/(Time taken)

The speed of a minute hand:

A minute hand travels **360°** in one hour. i.e. it travels through all the **12** divisions around the clock every hour. (*1 hour = 60 minutes*)

Speed of a minute hand = $(360^\circ)/(60 \text{ minutes})$

Speed of a minute hand = 6° per minute.

The speed of an hour hand:

An hour hand travels 30° in an hour. i.e. it covers a distance of 5 minutes (the gap between consecutive divisions) in 60 minutes.

Speed of an hour hand = $(30^\circ)/(60 \text{ minutes})$

Speed of an hour hand = $1/2^\circ$ per minute.

How about second hand?

Finding the time when the angle is known:

The logic below provides a trick to address problems involving angles of hands for other than standard aspects.

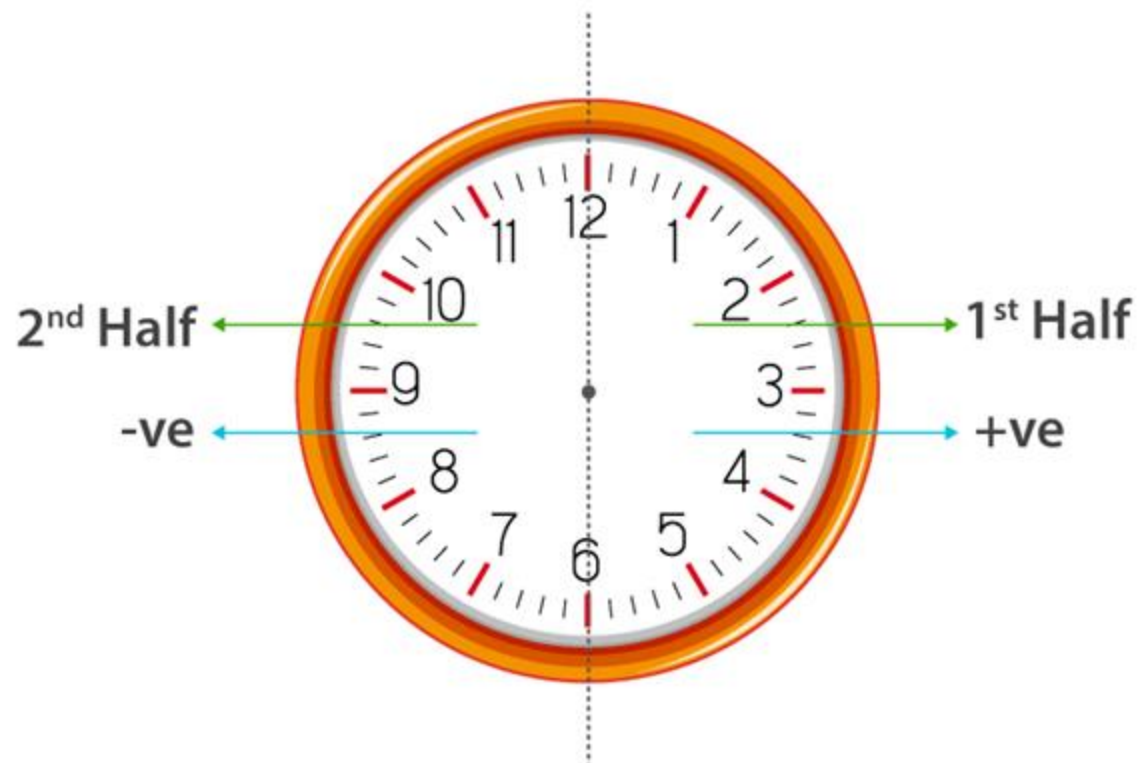
$$***T = 2/11 [H*30 \pm A]***$$

Where:

1. T stands for the time at which the angle formed.
2. H stands for an hour, which is running.

(If the question is for the duration between 4 o'clock and 5 o'clock, it's the 4th hour which is running hence the value of H will be '4'.)

3. A stands for the angle at which the hands are at present.



At what time between 3 and 4 o'clock, the hands makes an angle of 10 degrees?

Solution:

Given: $H = 3$, $A = 10$

Since both three and four lies in the first half considered a positive sign.

Calculations:

$$T = \frac{2}{11} [H*30 \pm A]$$

$$T = \frac{2}{11} [3*30 + 10]$$

$$T = \frac{2}{11} [90 + 10]$$

$$T = \frac{2}{11} [100]$$

$$T = \frac{200}{11}$$

$$T = 18 \frac{2}{11}$$

The answer indicates that the hands of a clock will make an angle of 10 between 3 and 4 o'clock at exactly 3:18:2/11 (3' o clock 18 minutes and 2/11 of minutes = $\frac{2}{11} * 60 = 10.9$ seconds)