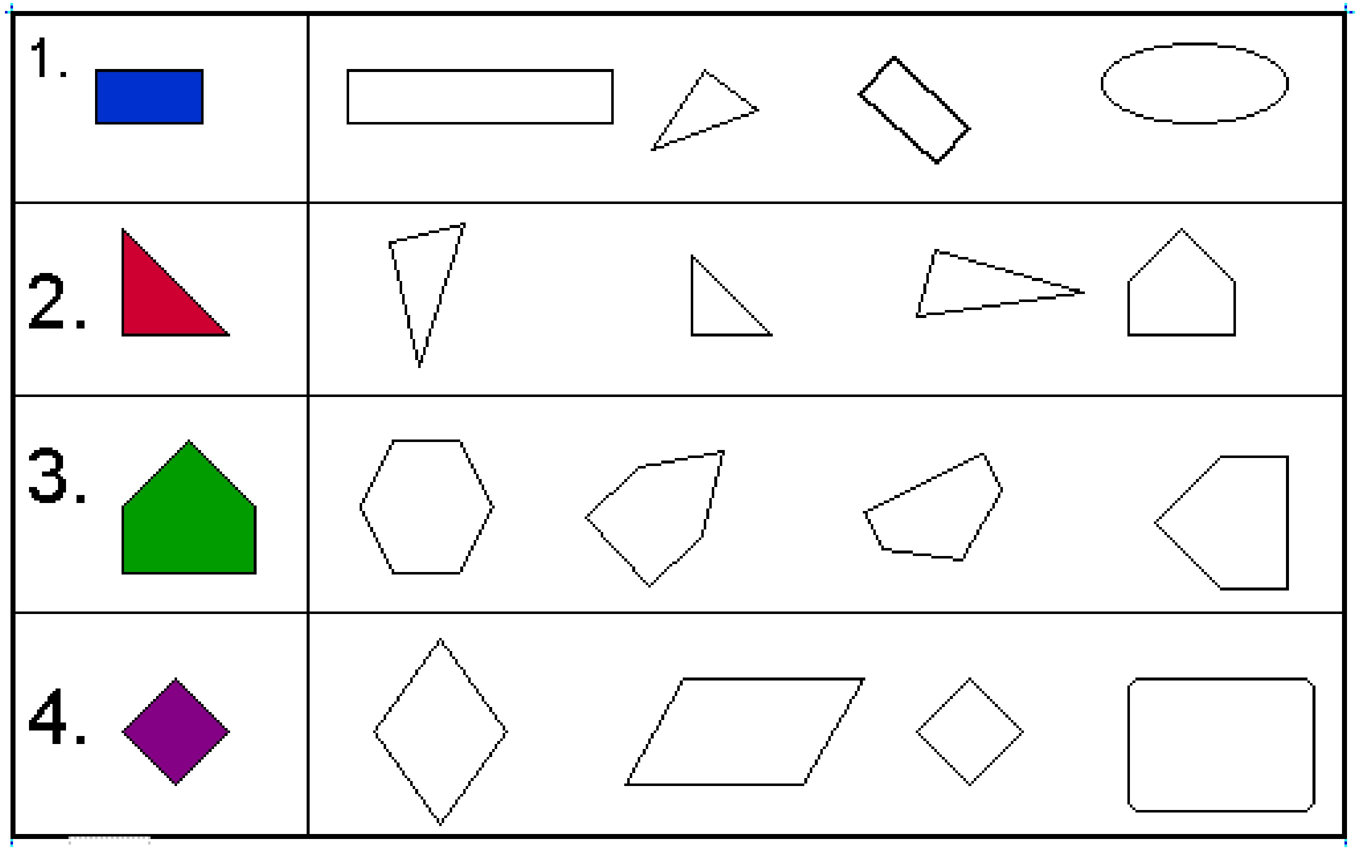
Similarity and Congruence

pg. 63-67

- Similarity: is a property that two or more shapes share if they are **similar** to each other. They have the same shape but not necessarily the same size.
- The symbol III means “is similar to”.



Let’s practice

- Orally do Ex. 5.5 with a partner pg. 63

Did you get the same?

Remember that congruent shapes are also similar.
(Similar shapes are not necessarily congruent.)

c is similar to f

a is similar to m

g is similar to n

l is similar to j (and k)

i is similar to r

(Learners may find other shapes similar by measuring sides and comparing ratios.)

Use similarity in calculations

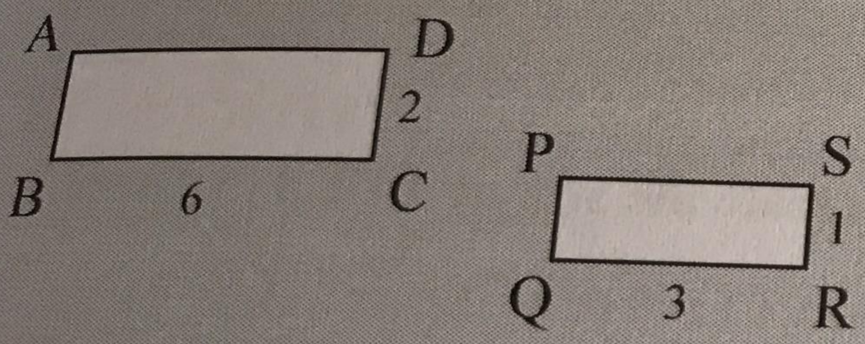
- If two or more shapes are similar, their corresponding sides are in the same ratio, and their corresponding angles are equal.

- Examples on pg. 64

...ms PQRS with diagonals

Complete: a) $\Delta PQR \equiv \Delta$ ____________ b) $\Delta SPQ \equiv \Delta$ ____________

Figures which have the **same shape** but are **not** necessarily the **same size** are said to be **similar**.
The symbol "|||" is read **"is similar to"**



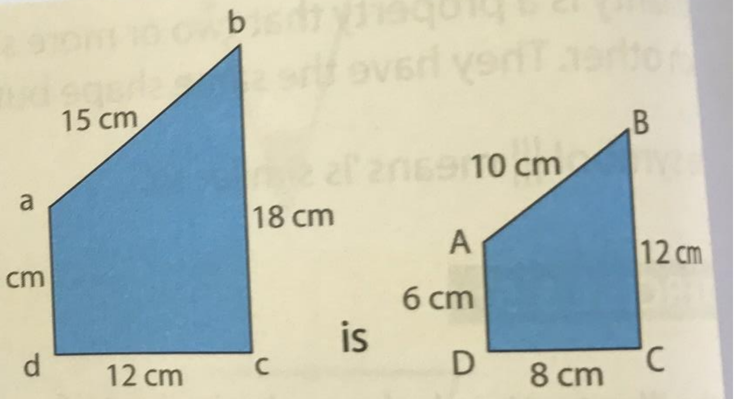
Rectangle ABCD ||| Rectangle PQRS because the corresponding (matching) angles are equal and the lengths of the corresponding sides are in the same ratio namely, $\frac{BC}{QR} = \frac{DC}{SR} = \frac{2}{1}$.

Use similarity in calculations

If two or more shapes are similar, their corresponding sides are in the same ratio, and their corresponding angles are equal.

Example

Are these two shapes similar?



Answer

Sides ab and AB form one pair of corresponding sides. Side ab 15 cm long and side AB is 10 cm long. The ratio of ab to AB is 15 : 10 which is 3 : 2 in simplest form.

If the two shapes are similar, the ratios of all three remaining pairs of corresponding sides will also equal 3 : 2.

Side bc corresponds to side BC. The ratio of their lengths is 18 : 12 or 3 : 2.
Side cd corresponds to side CD. The ratio of their lengths is 12 : 8 or 3 :
Side da corresponds to side DA. The ratio of their lengths is 9 : 6 or 3 : 2

All pairs of corresponding sides are in the same ratio. The two shapes are similar.

Example

HOW TO TELL IF TRIANGLES ARE SIMILAR

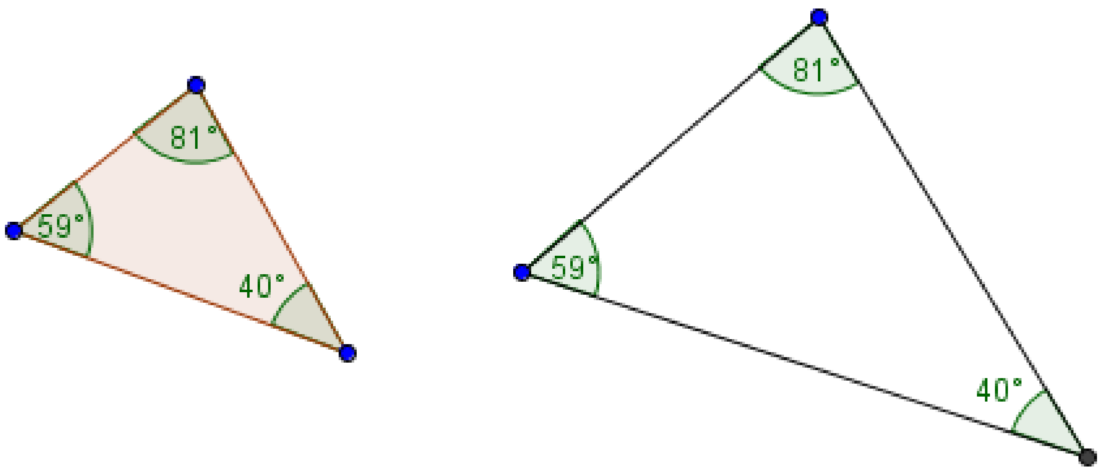
Triangles are similar if:

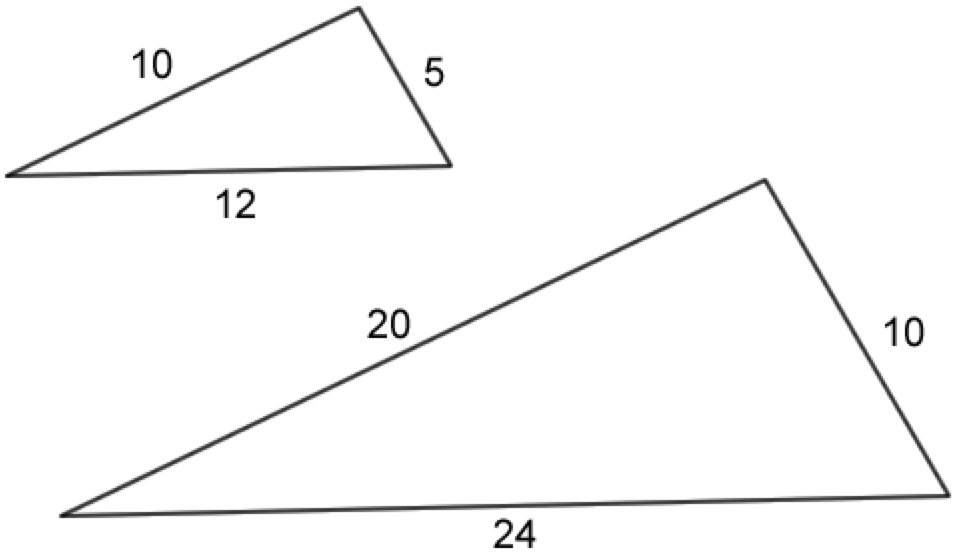
AAA (angle, angle, angle)

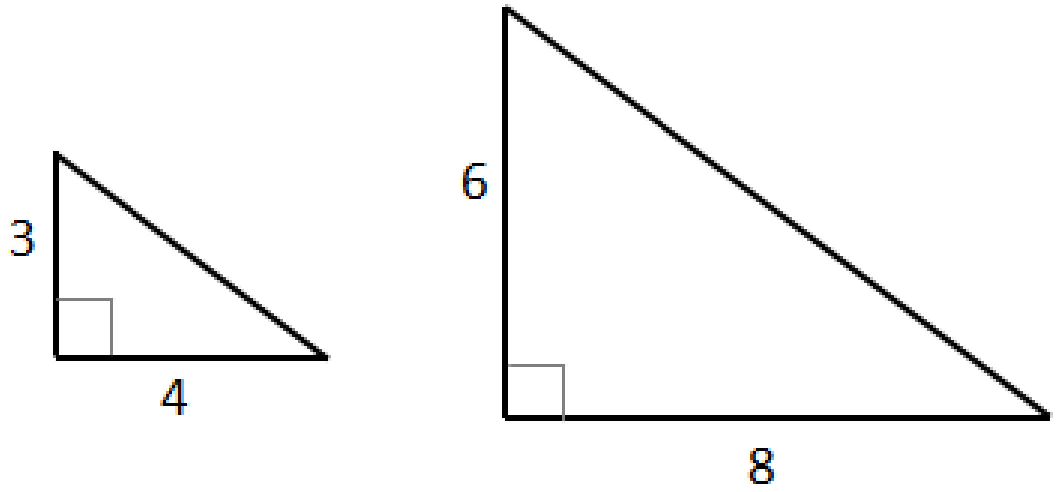
All three pairs of corresponding angles are the same.

SSS in same proportion (side, side, side)
All three pairs of corresponding sides are in the same ratio.

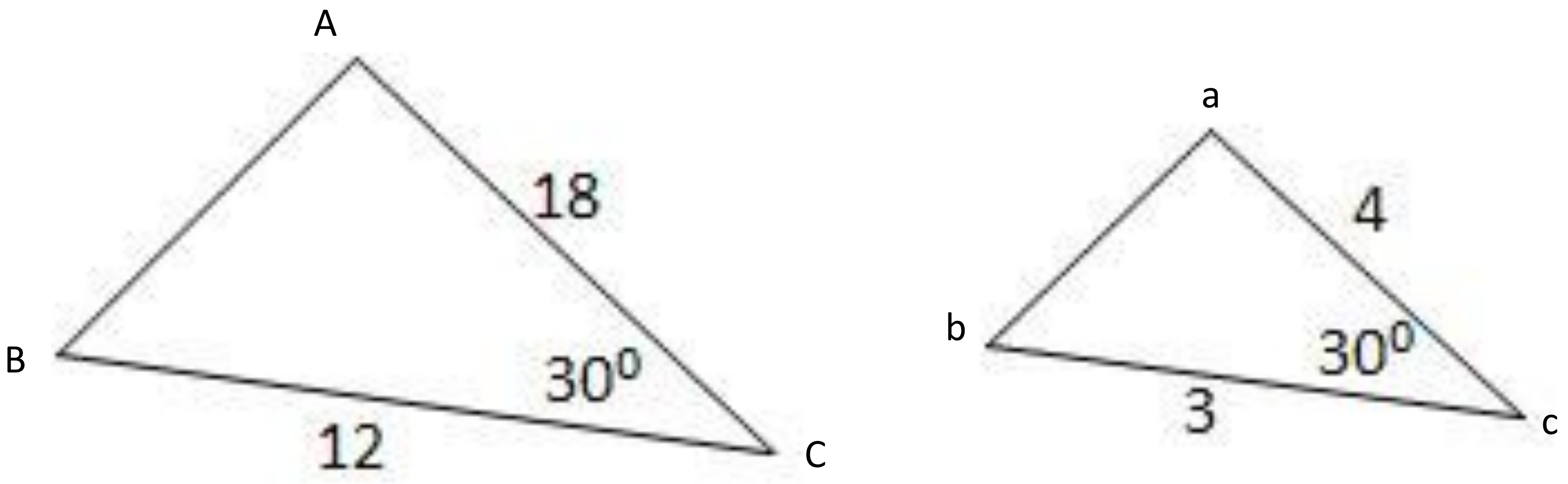
SAS (side, angle, side)
Two pairs of sides in the same ratio and the included angle equal.

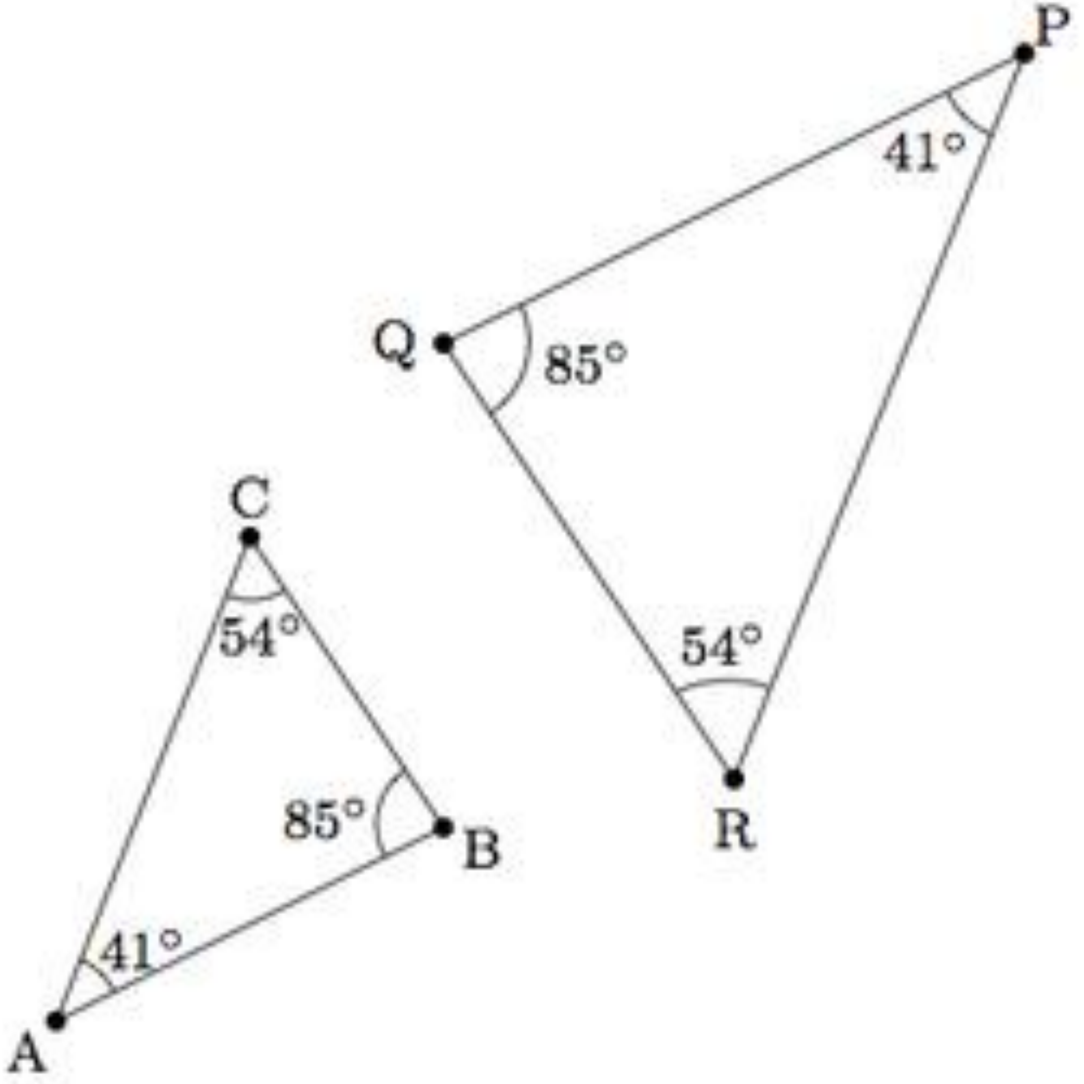

81°
59°
40°
81°
59°
40°

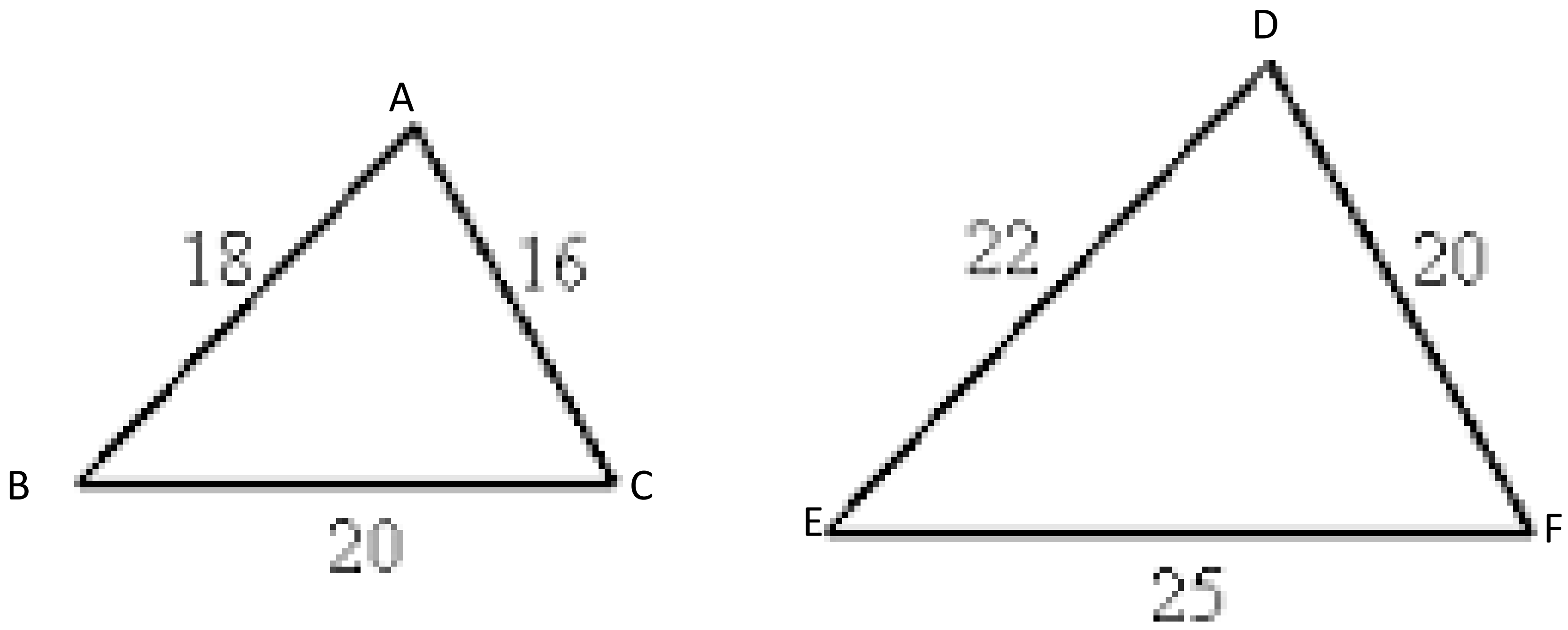

10
5
12
20
10
24

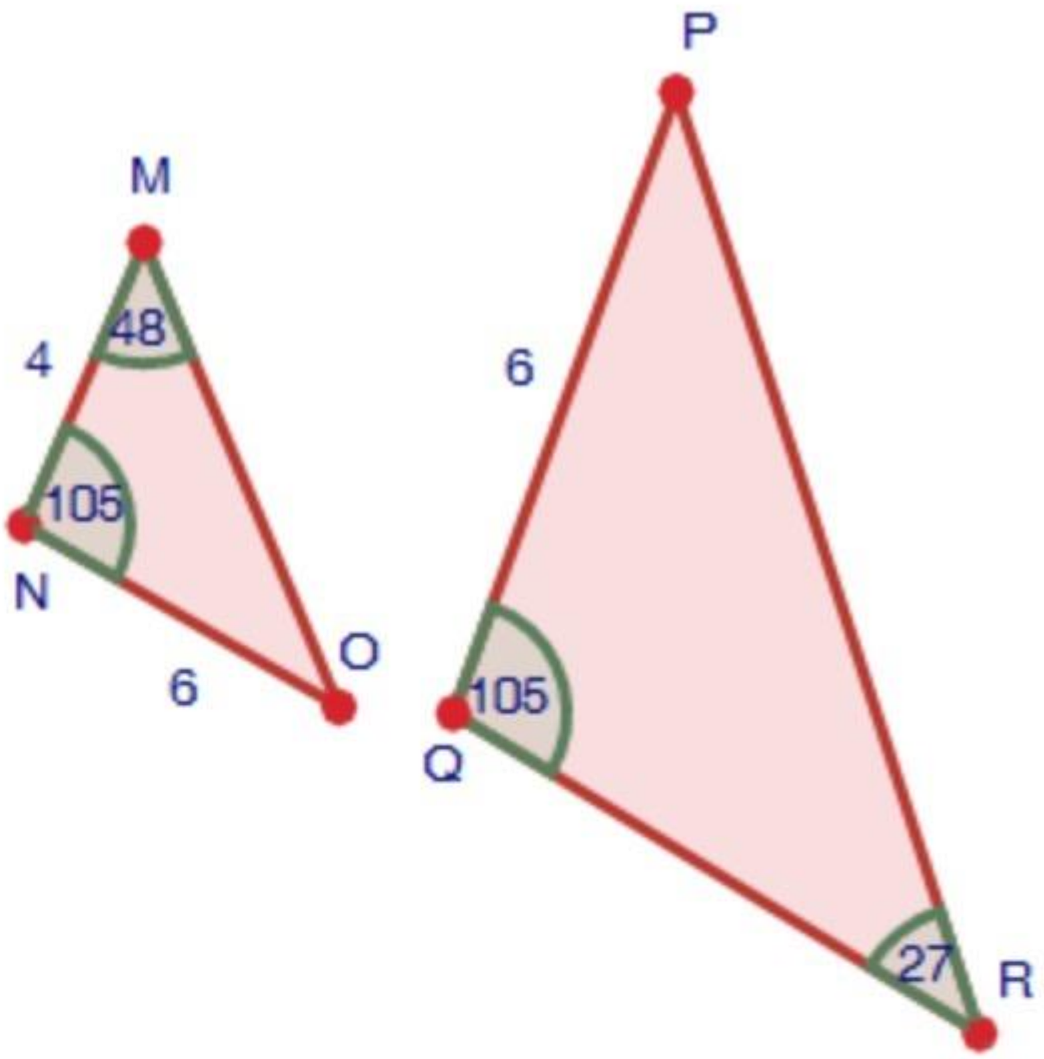

3
4
6
8

Are these triangles similar




P
41°
Q
85°
54°
R
C
54°
85°
B
41°
A


A
18
16
B
C
20
D
22
20
E
F
25

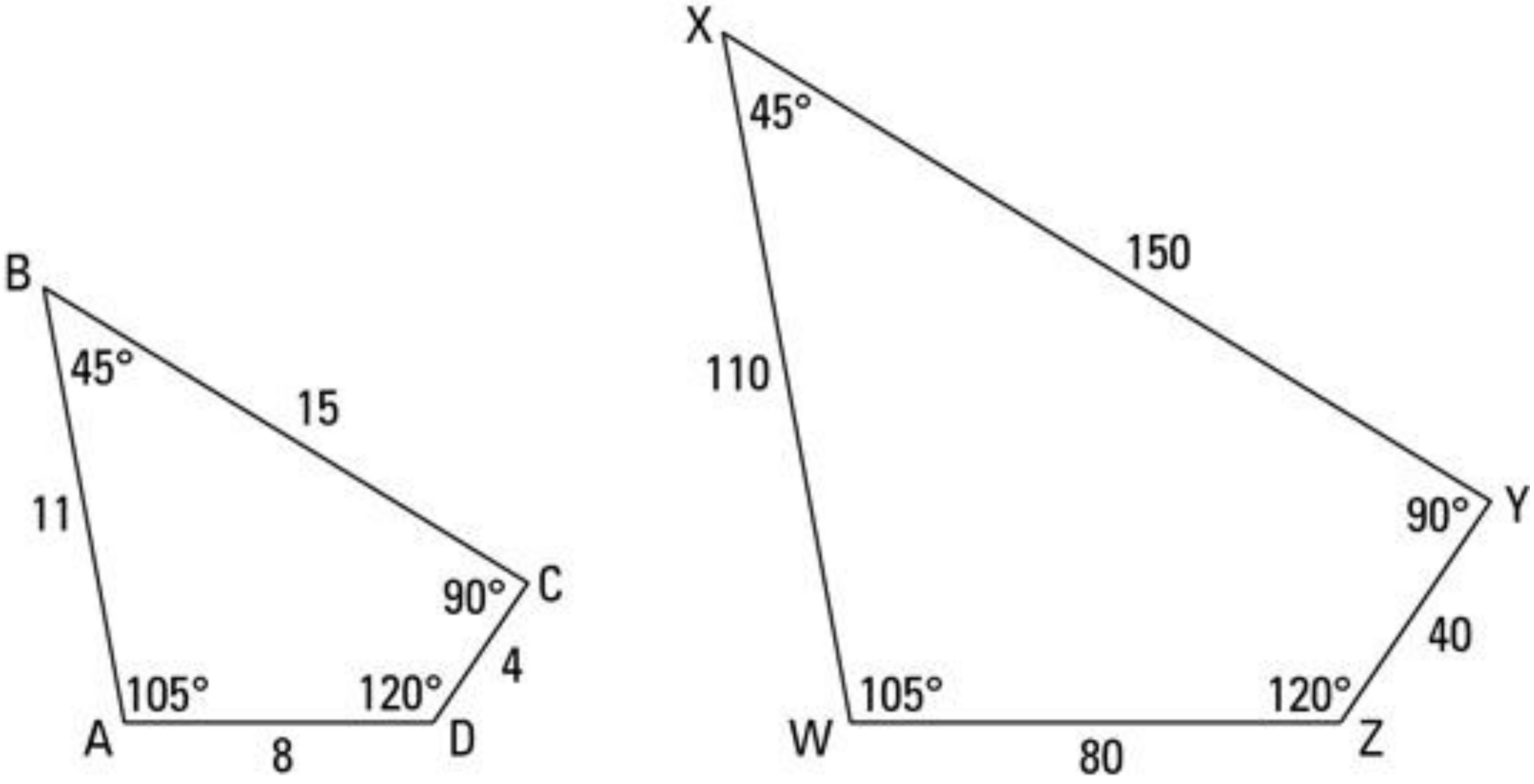

M
48
4
105
N
6
O
P
6
105
Q
27
R

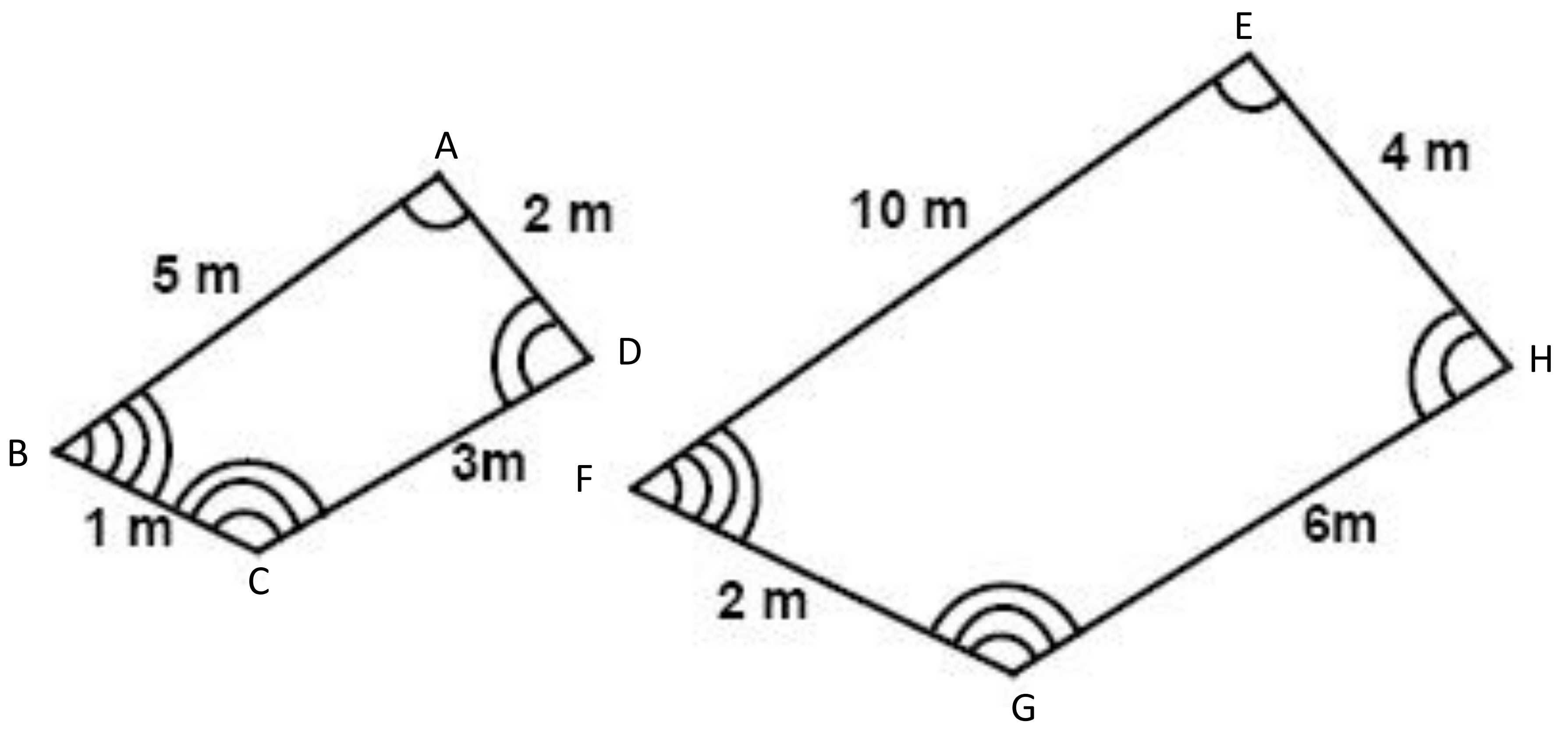
HOW TO TELL IF POLYGONS ARE SIMILAR?

Similar polygons have the same shape, but can be different sizes. Specifically, two polygons are similar if two things are true:

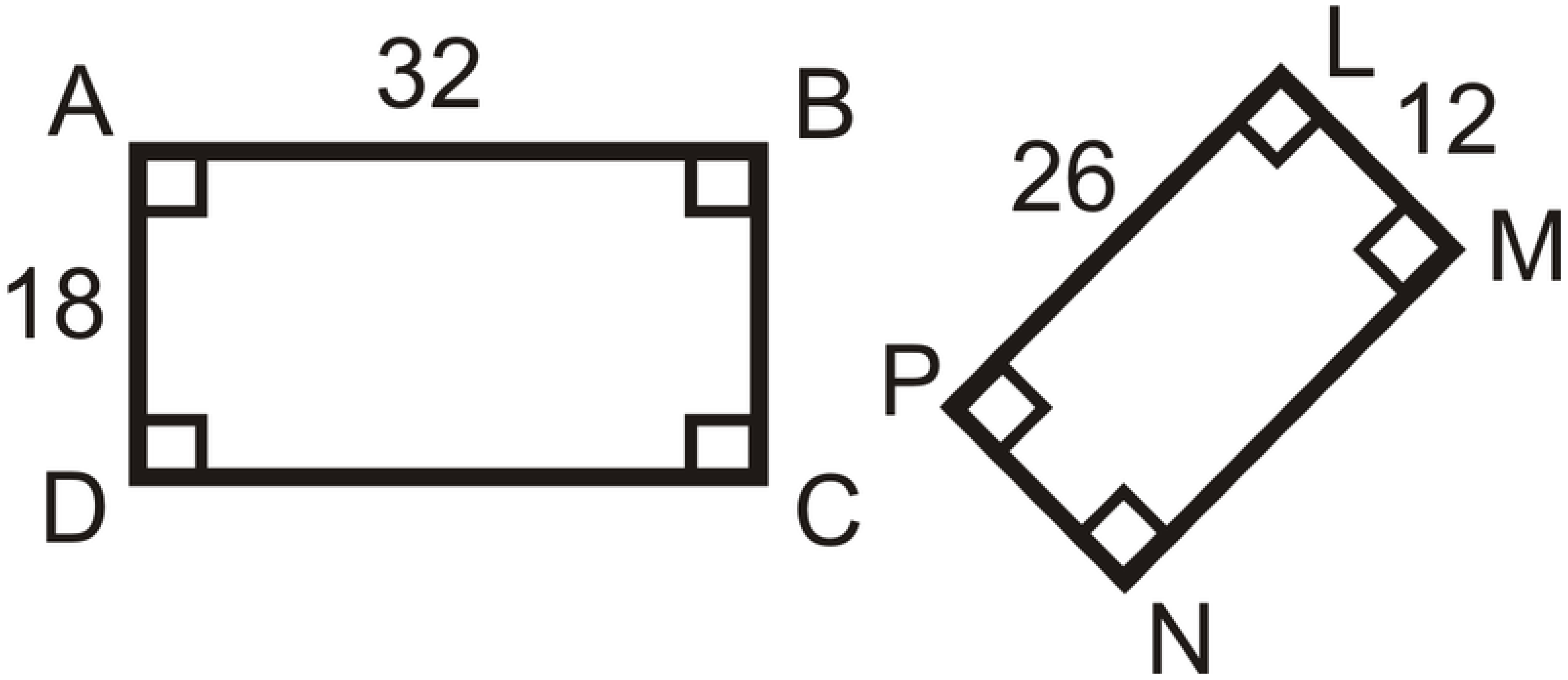
- The corresponding sides of each are in the same ratio.
- The corresponding interior angles are the same.

Are these polygons similar?





A
2 m
5 m
D
B
3m
1 m
C
E
4 m
10 m
H
F
6m
2 m
G


A
32
B
18
D
C
L
12
26
M
P
N

Similarity

Ex. 5.6 pg. 65

no. 1

Worksheet

Ex 5.6 - Memo

1. a) Yes, these shapes are similar. All corresponding sides are in the same ratio 4: 1

   b.) No, corresponding sides are not in the same ratio.

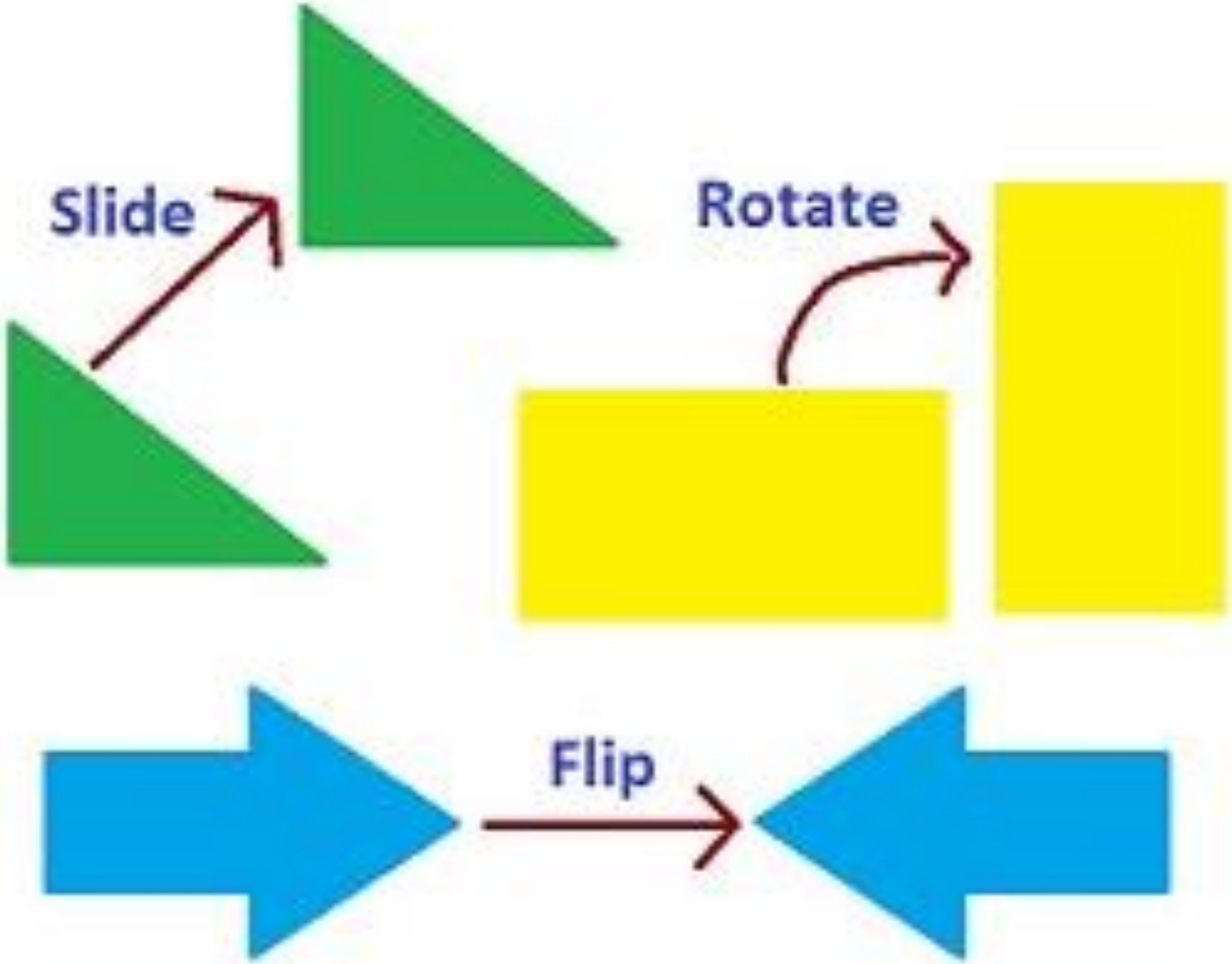
   c.) No, corresponding sides are not in the same ratio.

54 : 21	40: 16
18: 7	5: 2

Congruence

- We say that **two or more shapes** are congruent to each other if they are **exactly the same size and shape**. This means that **all the angles** and **sides in both shapes are equal**.

- Symbol for congruency $\equiv$


Slide
Rotate
Flip

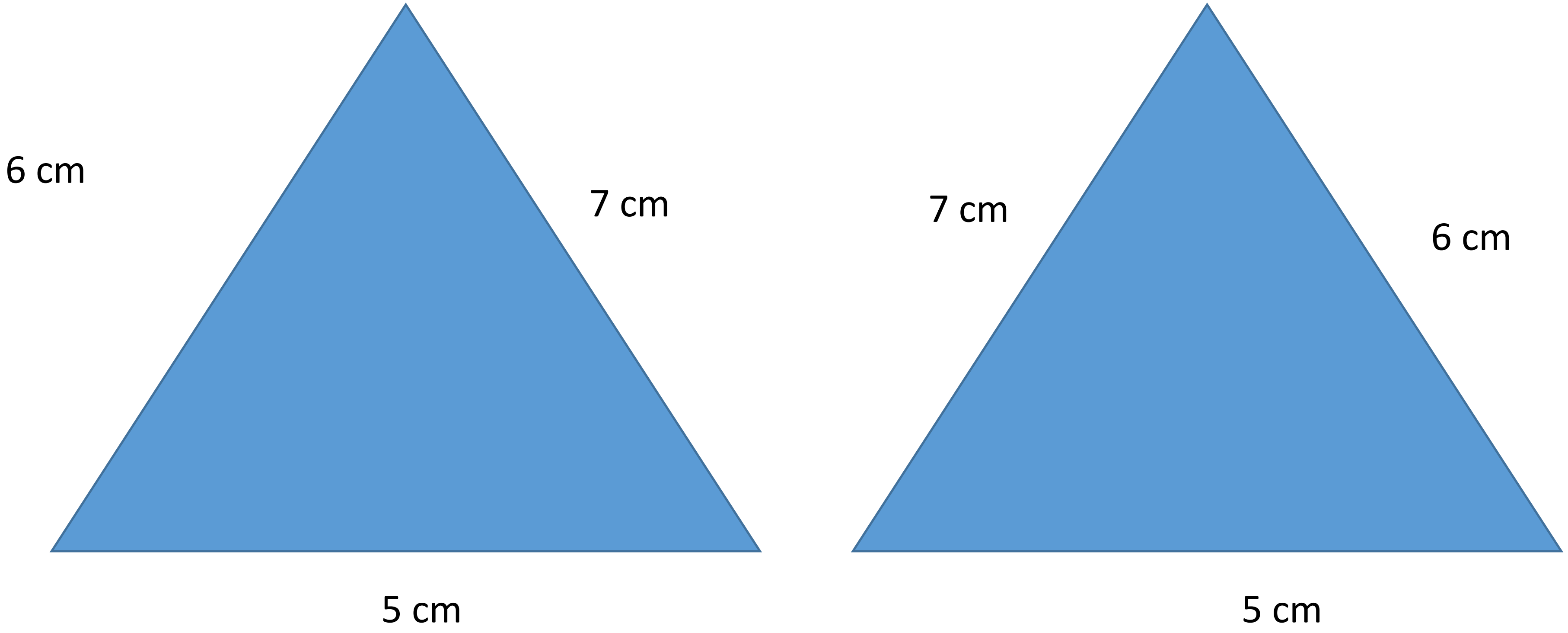
<u>Congruency</u>

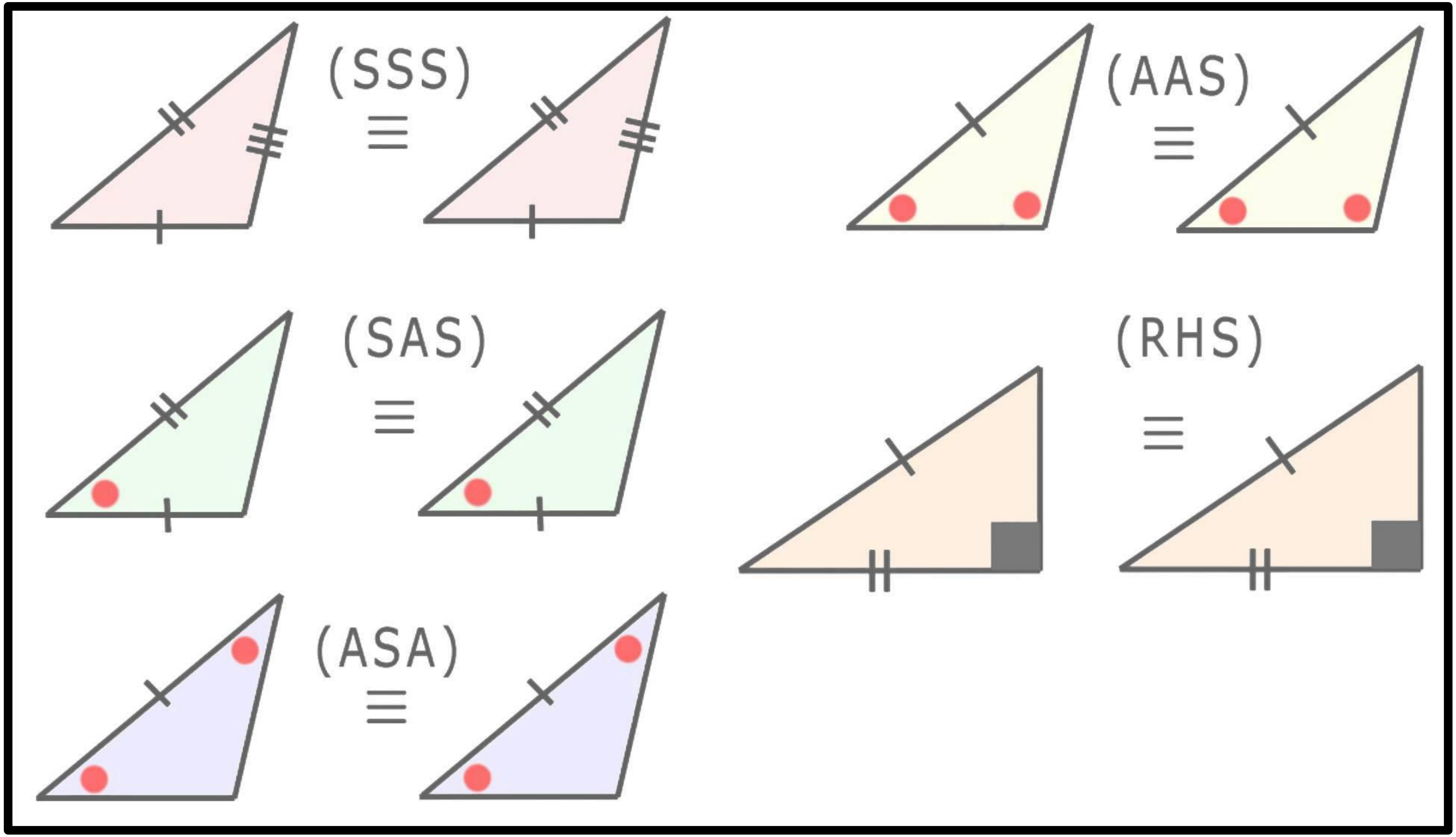
<u>Ex. 5.7 pg. 66</u>

Orally

Congruent triangles

- Congruent shapes have corresponding sides that are equal to each other and corresponding angles that are equal to each other.





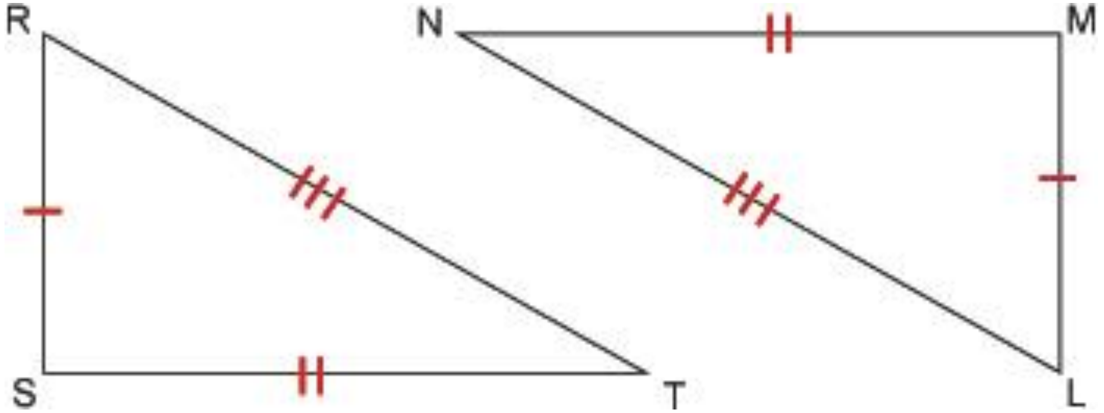
(SSS)
≡
(AAS)
≡
(SAS)
≡
(RHS)
≡
(ASA)
≡

There are certain facts that you can use to prove that triangles are congruent.

Two triangles are congruent if at least one of these statements are true:

1. All three sides of one triangle is equal to all three sides of the other. We call this SSS rule. SSS stand for Side, Side, Side.

In $\Delta\, RST$ and ΔMLN



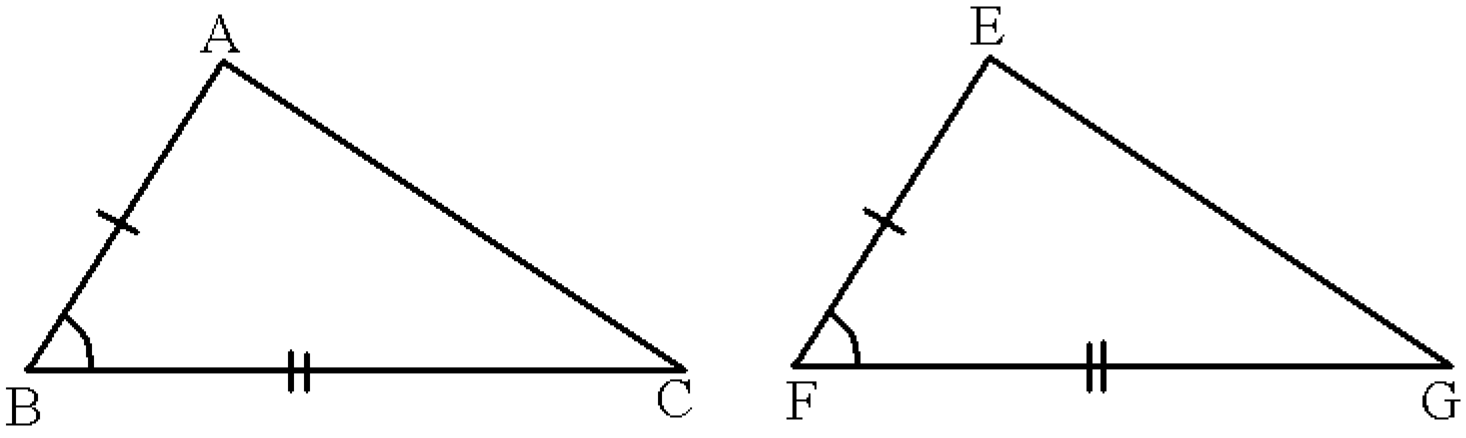
RS = ML

MN = ST

LN = RT

Therefore, $\Delta\, RST \equiv \Delta MLN$ SSS

2. Two sides of one triangle are equal to two sides of the other and the included angle is also equal. We call this the SAS rule. SAS stands for Side, Angle, Side.



In $\Delta\, ABC$ and $\Delta\, EFG$

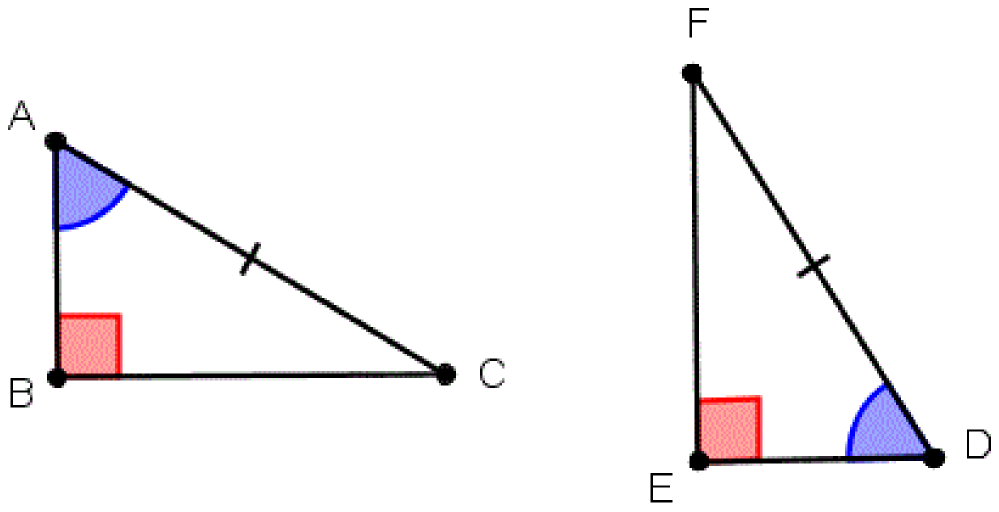
AB = EF

BC = FG

$\hat{B} = \hat{F}$

Therefore, $\Delta\, ABC \equiv \Delta EFG$ SAS

3. Two angles and a non-included side of one triangle are equal to two angles and the corresponding non-included side of the other. We call this the AAS rule. AAS stand for Angle, Angle, Side.



In $\Delta\, ABC$ and $\Delta\, DE$F

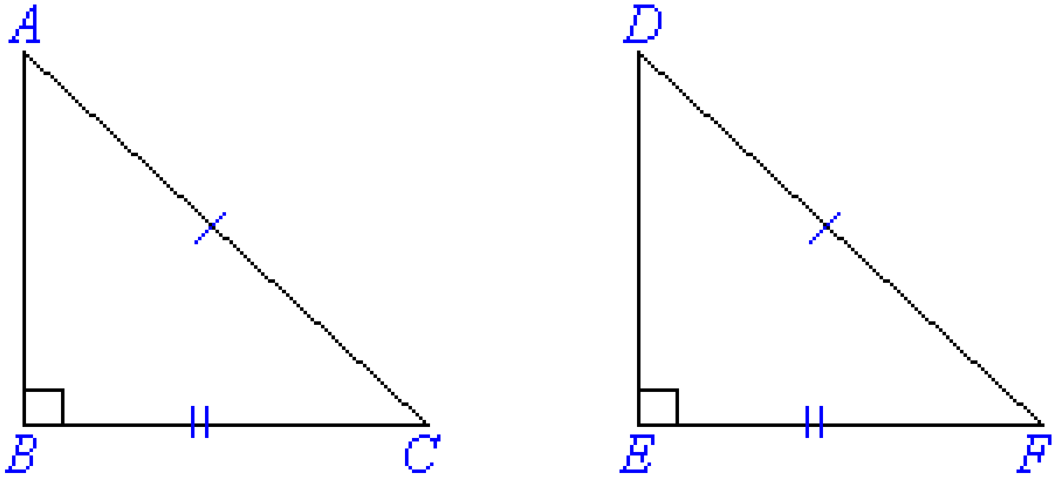
AC = FD

$\hat{B} = \hat{E} = 90°$

$\hat{A} = \hat{D}$

Therefore, $\Delta\, ABC \equiv \Delta DEF$ AAS

4. In a right-angled triangle, the hypotenuse and one other side in the first triangle are equal to the hypotenuse and the corresponding side in the second triangle. We call this the RHS rule. RHS stand for Right-angled, Hypotenuse, Side.



In $\Delta\, ABC$ and $\Delta\, DE$F

BC = EF

AC=DF (hypotenuse)

$\hat{B} = \hat{E} = 90°$

Therefore, $\Delta\,\mathrm{ABC} \equiv \Delta\mathrm{DEF}$ RHS

Congruent Triangles

Ex. 5.8 pg. 67

1-4

Worksheet

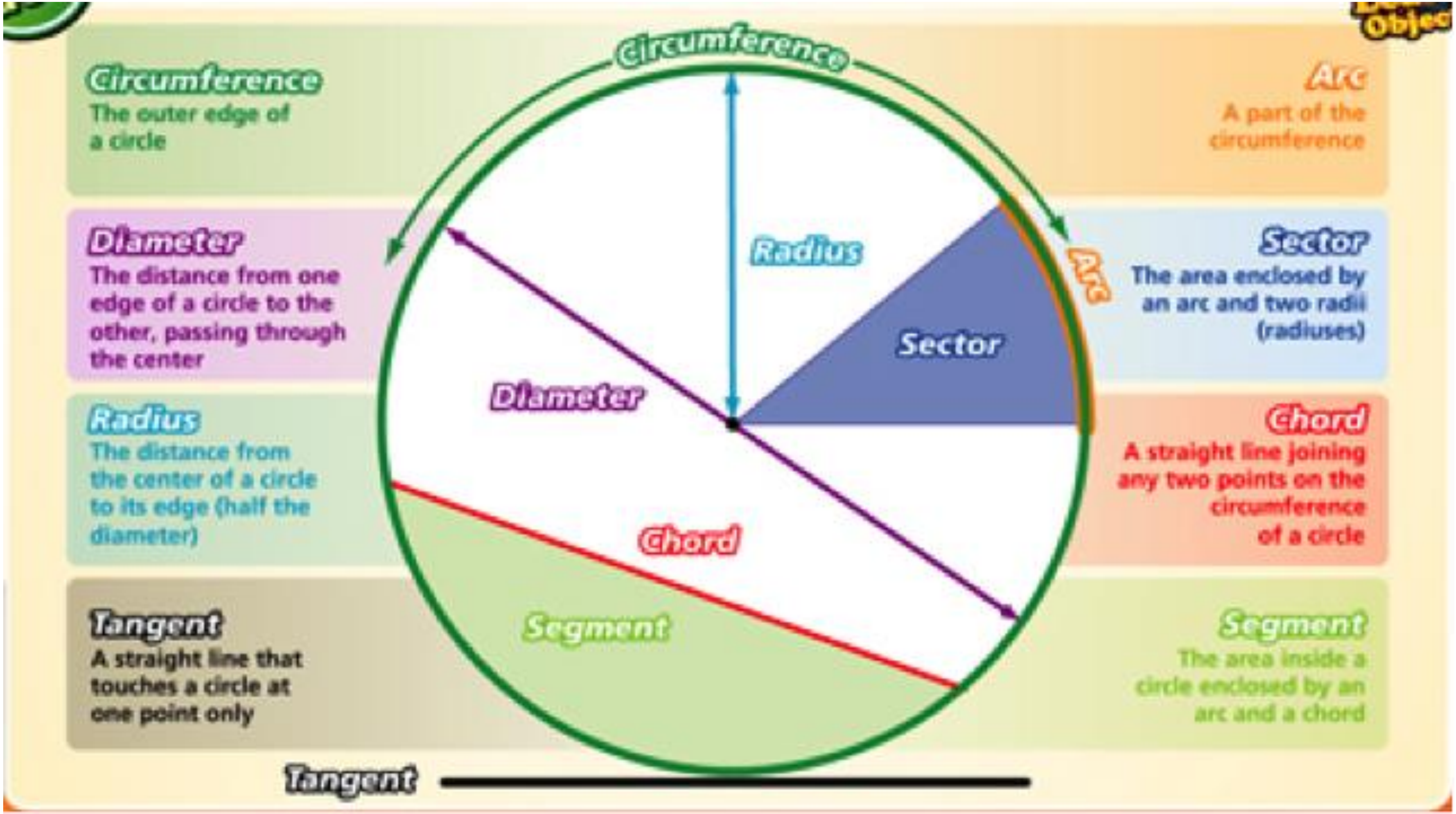
Ex. 5.8 pg.67 - Memo

1. $\Delta\,\mathrm{ABC} \equiv \Delta\mathrm{DEF}$ RHS
2. $\Delta\,\mathrm{bcd} \equiv \Delta\mathrm{efg}$ SSS
3. $\Delta\,\mathrm{onp} \equiv \Delta\mathrm{qrs}$ AAS

4. $\widehat{\mathrm{U}} + \widehat{\mathrm{V}} + \hat{\mathrm{Z}} = 180°$ Interior angles of a triangle add up to 180°

$$\hat{\mathrm{Z}} = 180° - 112°$$

$$\hat{\mathrm{Z}} = 68°$$


Circumference
The outer edge of a circle
Diameter
The distance from one edge of a circle to the other, passing through the center
Radius
The distance from the center of a circle to its edge (half the diameter)
Tangent
A straight line that touches a circle at one point only
Arc
A part of the circumference
Sector
The area enclosed by an arc and two radii (radiuses)
Chord
A straight line joining any two points on the circumference of a circle
Segment
The area inside a circle enclosed by an arc and a chord
Circumference
Radius
Arc
Sector
Diameter
Chord
Segment
Tangent

Properties of a circle

Ex. 5.9 pg. 69

1-4

1. a) ZOY
   b) OX, OY, OZ
   c) XZ, XY and YZ

2. A sector

3. a) Diameter = 8 cm
   b) Radius = 6 cm

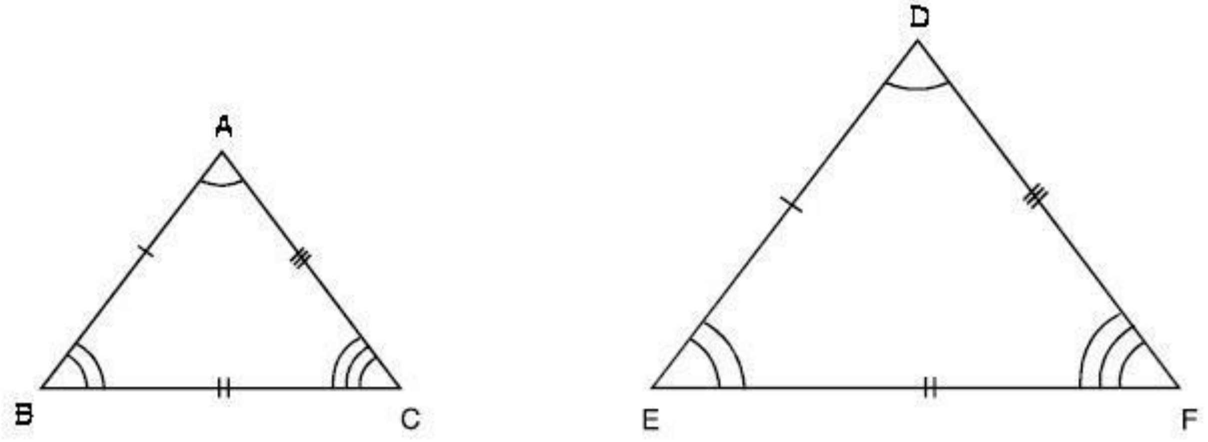
09-05-2017

Revision Topic 5 pg. 70-71

1 – 4

omit 5 and 6

7-12



If two triangles are similar the angles of both triangles are equal to one another.

1. An isosceles triangle has two sides equal and an equilateral triangle has three sides equal. (2)
2. Rhombus (1)
3. a) Shapes are congruent to each other if they are the same shape and size. (1)
   b) Shapes are similar to each other if they are the same shape. (1)
   (Corresponding angles are the same size and all the corresponding sides are in proportion.)
4. a) 122°
   b) 70,5°
   c) 58°
   d) 115°
   e) 38°

7. Yes, all three sides (and all three angles) are equal. (2)

8. No, the ratios of corresponding sides are not all equal
40: 32 = 5:4
25: 20 = 5:4
30: 25 = 6:5
33,5: 27,7 (3)

9. Angle VWX = 117° (2)
10. Angle N = 180° − 136° = 44° (2)
11. Length of the diameter = 2 × 15 cm = 30 cm (2)
12. OH, OG and OF are radii (3)