Congruence

Exercise 59:

Solution 1:

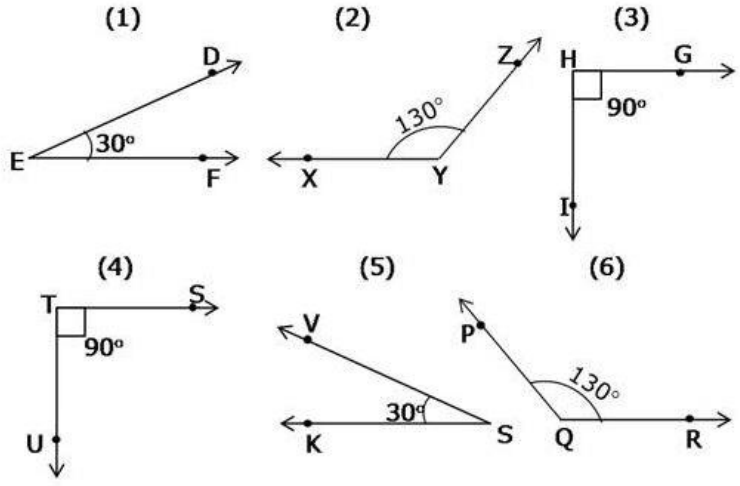
In figure (1), seg AB and seg CD are congruent since they are of the equal length. Similarly, in figure (3), seg GH and seg EF are congruent since they are of the equal length.

Solution 2:

The pair of congruent line segments are:
Seg SP and Seg VK
Seg MP and Seg AL
Seg UV and Seg MG

Exercise 60:

Solution 1:



1. m∠DEF = 30°
2. m∠XYZ = 130°
3. m∠GHI = 90°
4. m∠STU = 90°
5. m∠VSK = 30°
6. m ∠PQR = 130°

Angles of equal measures are congruent.
Hence, the pairs of congruent angles are:
m∠DEF = m∠VSK = 30°
∠DEF ≅ ∠VSK
∠XYZ and ∠PQR = 130°
∠XYZ ≅ ∠PQR
∠GHI and ∠STU = 90°
∠GHI ≅ ∠STU

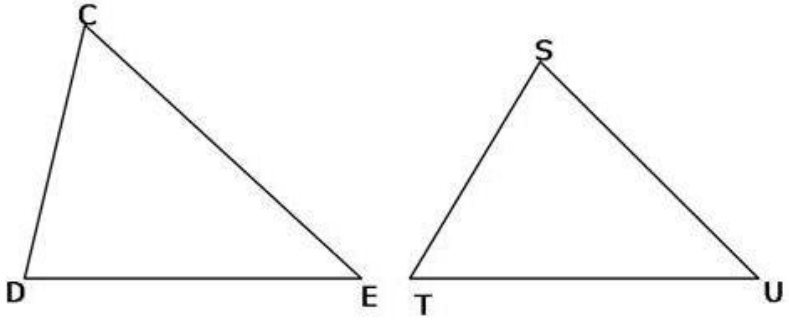
Solution 2:

Angles of equal measures are congruent.
Hence, the pairs of congruent angles are :
m∠J = m∠D = 42°
Hence, ∠J ≅ ∠D
m∠M = m∠I = 105°
Hence, ∠M ≅ ∠I
m∠S = m∠F = 54°
Hence, ∠S ≅ ∠F
m∠W = m∠H = 113°
Hence, ∠W ≅ ∠H
m∠B = m∠Y = 90°
Hence, ∠B ≅ ∠Y

Exercise 61:

Solution 1:

Let ∆CDE and ∆STU be the triangles as given below.



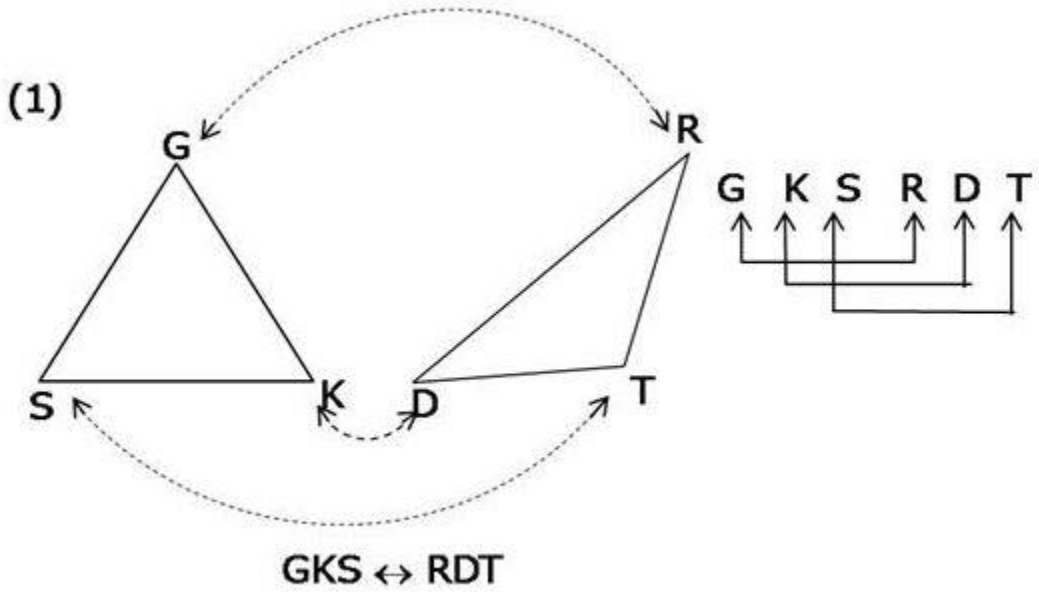
One to one correspondence between the vertices of ∆CDE and ∆STU can be written in six different ways as follows:

	The correspondence between vertices
(1)	C ↔ S, D ↔ T, E ↔ U
(2)	C ↔ S, D ↔ U, E ↔ T
(3)	C ↔ T, D ↔ S, E ↔ U
(4)	C ↔ T, D ↔ U, E ↔ S
(5)	C ↔ U, D ↔ T, E ↔ S
(6)	C ↔ U, D ↔ S, E ↔ T

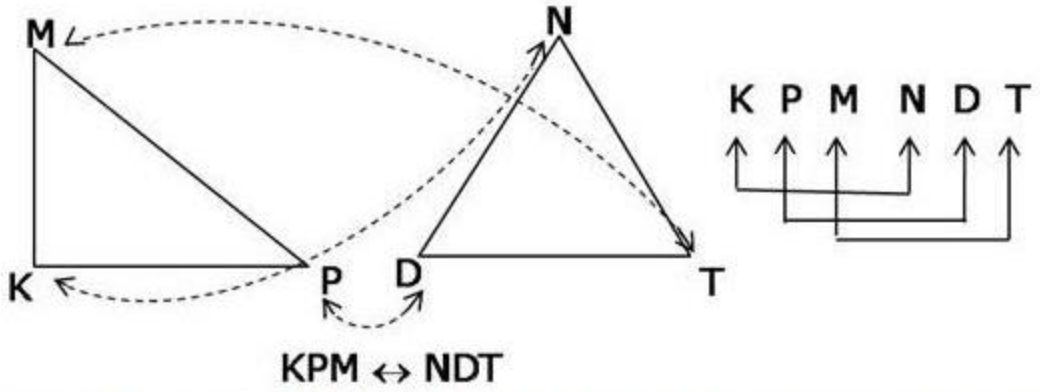
Solution 2:

Pairs of corresponding sides:
Side DH and side BS
Side HP and side SC
Side DP and side BC
Pairs of corresponding angles:
∠D and ∠B
∠H and ∠S
∠P and ∠C

Solution 3:



(2)



The given one to one correspondence between the vertices is shown above using arrows.

Exercise 62:

Solution 1:

The correspondence between the components of ΔABC and ΔSML can be written using symbols as follows:

	Pairs of congruent corresponding angles
(1)	∠A ≅ ∠S
(2)	∠B ≅ ∠L
(3)	∠C ≅ ∠M

	Pairs of congruent corresponding sides
(1)	Side AB ≅ Side SL
(5)	Side BC ≅ Side LM
(6)	Side AC ≅ Side SM

Solution 2:

Figure	Congruent corresponding angles	Congruent corresponding sides
(1)	∠M ≅ ∠A ∠G ≅ ∠C ∠K ≅ ∠D	Side MG ≅ Side AC Side GK ≅ Side CD Side MK ≅ Side AD
(2)	∠L ≅ ∠D ∠M ≅ ∠G ∠K ≅ ∠C	Side LM ≅ Side DG Side MK ≅ Side GC Side LK ≅ Side DC
(3)	∠A ≅ ∠P ∠V ≅ ∠N ∠Z ≅ ∠J	Side AV ≅ Side PN Side VZ ≅ Side NJ Side AZ ≅ Side PJ
(4)	∠P ≅ ∠R ∠N ≅ ∠M ∠K ≅ ∠D	Side PN ≅ Side RM Side NK ≅ Side MD Side PK ≅ Side RD

Solution 3:

Figure (1):
In ∆PQR and ∆XYZ,
Side QR ≅ Side YZ
Side PQ ≅ Side XZ
Side PR ≅ Side XY
P ↔ X, Q ↔ Z and R ↔ Y
Thus, ∆PQR and ∆XYZ are congruent by the correspondence PQR ↔ XZY.

Figure (2):
In ∆ABC and ∆DEF,
Side AC ≅ Side DF
Side AB ≅ Side F
Side BC ≅ Side DE
A ↔ F, B ↔ E and C ↔ D
Thus, ∆ABC and ∆DEF are congruent by the correspondence ABC ↔ FED.

Exercise 63:

Solution 1:

From the identical marks it can be observed that each side of □XYZW is congruent to each side of □PQRS.

Hence, we have 16 pairs of identical sides.
Also, since all the angles are right angles, we have 16 pairs of congruent angles.

- two pairs of congruent segments:

Seg YZ ≅ Seg QR and Seg XW ≅ Seg PS

- two pairs of congruent angles:

∠Y ≅ ∠Q and ∠Z ≅ ∠R

- The statement □XYZW ≅ □PQRS is true.

The four sides of □PQRS are congruent to the corresponding four sides of □XYZW and the four angles of □PQRS are congruent to the corresponding four angles of □XYZW.
Hence, the statement □XYZW ≅ □PQRS is true.

Solution 2:

From the identical marks it can be observed that there are 8 pairs of identical sides.
Also, there are 16 pairs of congruent angles since all the angles are right angles.

- Two pairs of congruent segments:
  Seg GF ≅ Seg NM and Seg DG ≅ Seg KN
- Two pairs of congruent angles:
  ∠E ≅ ∠L and ∠G ≅ ∠N
- The statement □DEFG ≅ □KLMN is true.

The four sides of □DEFG are congruent to the corresponding four sides of □DEFG and the four angles of □KLMN are congruent to the corresponding four angles of □DEFG.
Hence, the statement □DEFG ≅ □KLMN is true.

Solution 3:

Pairs of congruent quadrilaterals are:
□ABCD ≅ □PGHK …..[figure (1) and figure (7)]
□SMLK ≅ □EFGH …..[figure (2) and figure (8)]
□PQRS ≅ □FAXD …..[figure (4) and figure (6)]

Exercise 64:

Solution 1:

Congruent circles are:

1. Figure (1) and figure (7).
2. Figure (2) and figure (5).
3. Figure (3) and figure (8).
4. Figure (4) and figure (6).