पु॰ना International School
Shree Swaminarayan Gurukul, Zundal

Class – VII
Sub – Maths
Specimen Copy
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INDEX

Class –VII Mathematics (Ex. 5.1)

Answers

1. Complementary angle = 90° – given angle
   (i) Complement of $20^\circ = 90^\circ - 20^\circ = 70^\circ$
   (ii) Complement of $63^\circ = 90^\circ - 63^\circ = 27^\circ$
   (iii) Complement of $57^\circ = 90^\circ - 57^\circ = 33^\circ$
2. Supplementary angle = 180° – given angle (i)
   Supplement of $105^\circ = 180^\circ - 105^\circ = 75^\circ$
   (ii) Supplement of $87^\circ = 180^\circ - 87^\circ = 93^\circ$
   (iii) Supplement of $154^\circ = 180^\circ - 154^\circ = 26^\circ$
3. If sum of two angles is 180°, then they are called supplementary angles.
   If sum of two angles is 90°, then they are called complementary angles.
   (i) $65° + 115° = 180°$ These are supplementary angles.
   (ii) $63° + 27° = 90°$ These are complementary angles.
   (iii) $112° + 68° = 180°$ These are supplementary angles.
   (iv) $130° + 50° = 180°$ These are supplementary angles.
   (v) $45^\circ + 45^\circ = 90^\circ$ These are complementary angles.
   (vi) $80° + 10° = 90°$ These are complementary angles.
4. Let one of the two equal complementary angles be x.
   $\therefore \quad x + x = 90^\circ \quad \Rightarrow \quad 2x = 90^\circ \quad \Rightarrow \quad x = \frac{90^\circ}{2} = 45^\circ$
   Thus, 45° is equal to its complement.
5. Let x be two equal angles of its supplement.
   Therefore, $x + x = 180°$ [Supplementary angles]
   $\Rightarrow \quad 2x = 180°$
   $\Rightarrow \quad x = \frac{180°}{2} = 90^\circ$
   Thus, 90° is equal to its supplement.
6. I f $\angle 1$ is decreased then, $\angle 2$ will increase with the same measure, so that both the angles still remain supplementary.
7. (i) No, because sum of two acute angles is less than $180°$.
   (ii) No, because sum of two obtuse angles is more than $180°$.
   (iii) Yes, because sum of two right angles is $180°$.
8. Let the complementary angles be x and y, i.e., $x + y = 90^\circ$
   It is given that $x > 45^\circ$
   Adding y both sides, $x + y > 45^\circ + y$
   $\Rightarrow \quad 90^\circ > 45^\circ + y \quad \Rightarrow \quad 90^\circ - 45^\circ > y \quad \Rightarrow \quad y < 45^\circ$
   Thus, its complementary angle is less than 45°.

9. (i) Yes, in $\angle$ AOE, OC is common arm.
   (ii) No, they have no non-common arms on opposite side of common arm.
   (iii) Yes, they form linear pair.
   (iv) Yes, they are supplementary.
   (v) Yes, they are vertically opposite angles.
   (vi) Vertically opposite angles of $\angle 5$ is $\angle$COB.
10. (i) Vertically opposite angles, $\angle 1, \angle 4$; $\angle 5$, $\angle 2 + \angle 3$.
   (ii) Linear pairs $\angle 1, \angle 5$; $\angle 5, \angle 4$.
11. $\angle 1$ and $\angle 2$ are not adjacent angles because their vertex is not common.
12. (i) $x = 55°$ [Vertically opposite angles]
   Now $55° + y = 180°$ [Linear pair]
   $\Rightarrow$ $y = 180° - 55° = 125°$
   Also $y = z = 125°$ [Vertically opposite angles]
   Thus, $x = 55°, y = 125°$ and $z = 125°$.

   (ii) $40° + x + 25° = 180°$ [Angles on straight line]
   $\Rightarrow$ $65° + x = 180°$
   $\Rightarrow$ $x = 180° - 65° = 115°$
   Now $40° + y = 180°$ [Linear pair]
   $\Rightarrow$ $y = 180° - 40° = 140°$ (i)
   Also $y + z = 180°$ [Linear pair]
   $\Rightarrow$ $140° + z = 180°$ [From eq. (i)]
   $\Rightarrow$ $z = 180° - 140° = 40°$
   Thus, $x = 115°, y = 140°$ and $z = 40°$.

13. (i) $90°$ (ii) $180°$ (iii) supplementary
   (iv) linear pair (v) equal (vi) obtuse angles
14. (i) Obtuse vertically opposite angles means greater than $90°$ and equal $\angle$ AOD = $\angle$ BOC.
   (ii) Adjacent complementary angles means angles have common vertex, common arm, non-common arms are on either side of common arm and sum of angles is $90°$.
   (iii) Equal supplementary angles means sum of angles is $180°$ and supplement angles are equal.
   (iv) Unequal supplementary angles means sum of angles is $180°$ and supplement angles are unequal.
   i.e., $\angle$ AOE, $\angle$ EOC; $\angle$ AOD, $\angle$ DOC and $\angle$ AOB, $\angle$ BOC
   (v) Adjacent angles that do not form a linear pair mean, angles have common ray but the angles in a linear pair are not supplementary.
   i.e., $\angle$ AOB, $\angle$ AOE; $\angle$ AOE, $\angle$ EOD and $\angle$ EOD, $\angle$ COD

Class –VII Mathematics (Ex. 5.2)

Answers

1. (i) Given, $a \parallel b$ then $\angle 1 = \angle 5$ [Corresponding angles]

If two parallel lines are cut by a transversal, each pair of corresponding angles are equal in measure.

(ii) Given, $\angle 4 = \angle 6$, then $a \parallel b$ [Alternate interior angles]

When a transversal cuts two lines such that pairs of alternate interior angles are equal, the lines have to be parallel.

(iii) Given, $\angle 4 + \angle 5 = 180°$, then $a \parallel b$ [

When a transversal cuts two lines, such that pairs of interior angles on the same side of transversal are supplementary, the lines have to be parallel.

2. (i) The pairs of corresponding angles:

$\angle 1, \angle 5$; $\angle 2, \angle 6$; $\angle 4, \angle 8$ and $\angle 3, \angle 7$

(ii) The pairs of alternate interior angles are:

$\angle 3, \angle 5$ and $\angle 2, \angle 8$

(iii) The pair of interior angles on the same side of the transversal:

$\angle 3, \angle 8$ and $\angle 2, \angle 5$

(iv) The vertically opposite angles are:

$\angle 1, \angle 3$; $\angle 2, \angle 4$; $\angle 6, \angle 8$ and $\angle 5, \angle 7$

3. Given, $p \parallel q$ and cut by a transversal line.

$\because$ $125° + e = 180°$ [Linear pair]

$\therefore$ $e = 180° - 125° = 55°$ (i)

Now $e = f = 55°$ [Vertically opposite angles]

Also $a = f = 55°$ [Alternate interior angles]

$a + b = 180°$ [Linear pair]

$\Rightarrow$ $55° + b = 180°$ [From eq. (i)]

$\Rightarrow$ $b = 180° - 55° = 125°$

Now $a = c = 55°$ and $b = d = 125°$ [Vertically opposite angles]

Thus, $a = 55°, b = 125°, c = 55°, d = 125°, e = 55°$ and $f = 55°$.

4. (i) Given, $l \parallel m$ and t is transversal line.

$\therefore$ Interior vertically opposite angle between lines l and $t = 110°$.

$\therefore$ $110° + x = 180°$ [Supplementary angles]

$\Rightarrow$ $x = 180° - 110° = 70°$

(ii) Given, $l \parallel m$ and t is transversal line.

$x + 2x = 180$ [Interior opposite angles]

$\Rightarrow$ $3x = 180°$ $\Rightarrow$ $x = \frac{180°}{3} = 60°$

(iii) Given, $l \parallel m$ and $a \parallel b$.

$x = 100°$ [Corresponding angles]

5. (i) Given, AB $\parallel$ DE and BC is a transversal line and $\angle ABC = 70°$

$\therefore$ $\angle ABC = \angle DGC$ [Corresponding angles]

$\therefore$ $\angle DGC = 70°$ ...(i)

(ii) Given, BC $\parallel$ EF and DE is a transversal line and $\angle DGC = 70°$

$\therefore$ $\angle DGC = \angle DEF$ [Corresponding angles]

$\therefore$ $\angle DEF = 70°$ [From eq. (i)]

6. (i) $126° + 44° = 170°$

l is not parallel to m because sum of interior opposite angles should be $180°$.

(ii) $75° + 75° = 150°$

l is not parallel to m because sum of angles does not obey the property of parallel lines.

(iii) $57° + 123° = 180°$

l is parallel to m due to supplementary angles property of parallel lines.

(iv) $98° + 72° = 170°$

l is not parallel to m because sum of angles does not obey the property of parallel lines.

NCERT Solutions for Class 7 Maths Chapter 6

The Triangle and its Properties Class 7

Chapter 6 The Triangle and its Properties Exercise 6.1, 6.2, 6.3, 6.4, 6.5 Solutions

Exercise 6.1 : Solutions of Questions on Page Number: **116**

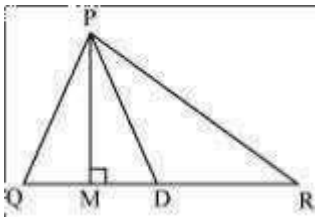
Q1 :

In ΔPQR, D is the mid-point of $\overline{QR}$.

$\overline{PM}$ is_____.

PD is_____.

Is QM = MR?



Answer :

(i) Altitude

(ii) Median

(iii) No

Q2 :

Draw rough sketches for the following:

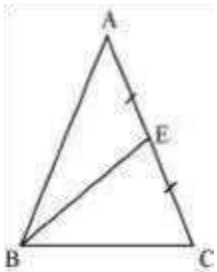
(a) In ΔABC, BE is a median.

(b) In ΔPQR, PQ and PR are altitudes of the triangle.

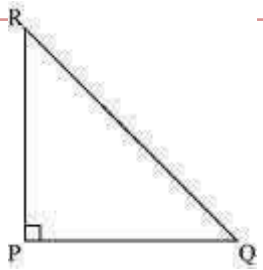
(c) In ΔXYZ, YL is an altitude in the exterior of the triangle.

Answer :

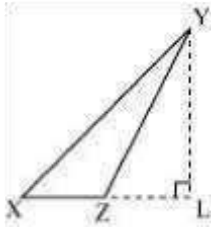
(a)



(b)



(c)

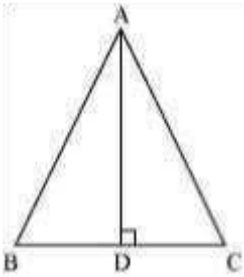


Here, it can be observed that for ΔXYZ, YL is an altitude drawn exterior to side XZ which is extended up to point L.

Q3 :

Verify by drawing a diagram if the median and altitude of an isosceles triangle can be same.

Answer :

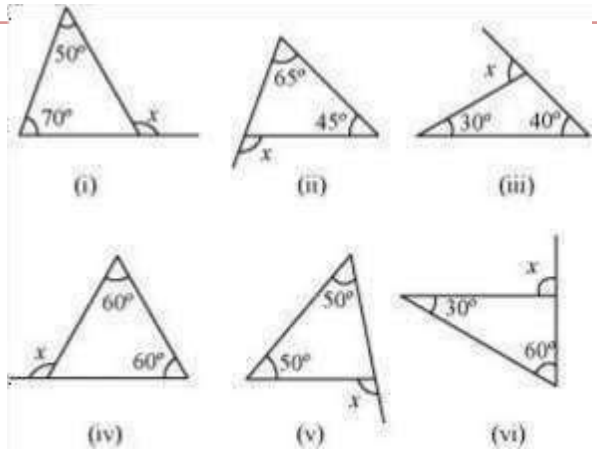


Draw a line segment AD perpendicular to BC. It is an altitude for this triangle. It can be observed that the length of BD and DC is also same. Therefore, AD is also a median of this triangle.

Exercise 6.2 : Solutions of Questions on Page Number: **118**

Q1 :

Find the value of the unknown exterior angle *x* in the following diagrams:



Answer :

(i) $x = 50° + 70°$ (Exterior angle theorem) $x = 120°$

(ii) $x = 65° + 45°$ (Exterior angle theorem)

$= 110°$

(iii) $x = 40° + 30°$ (Exterior angle theorem)

$= 70°$

(iv) $x = 60° + 60°$ (Exterior angle theorem)

$= 120°$

(v) $x = 50° + 50°$ (Exterior angle theorem)

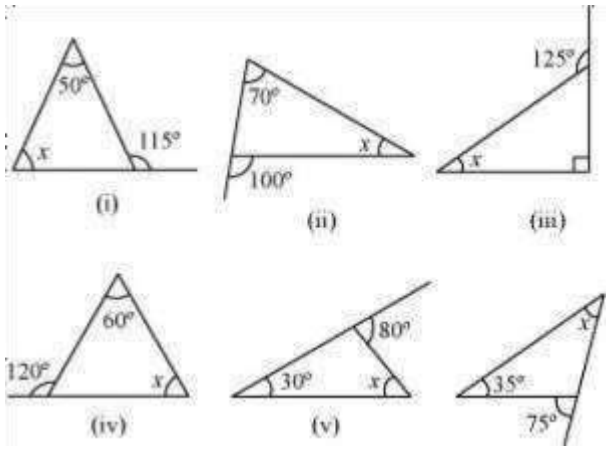
$= 100°$

(vi) $x = 30° + 60°$ (Exterior angle theorem)

$= 90°$

Q2 :

Find the value of the unknown interior angle *x* in the following figures:



Answer :

(i) $x + 50° = 115°$ (Exterior angle theorem)

$x = 115° - 50° = 65°$

(ii) $70° + x = 100°$ (Exterior angle theorem)

$x = 100° - 70° = 30°$

(iii) $x + 90° = 125°$ (Exterior angle theorem)

$x = 125° - 90° = 35°$

(iv) $x + 60° = 120°$ (Exterior angle theorem)

$x = 120° - 60° = 60°$

(v) $x + 30° = 80°$ (Exterior angle theorem)

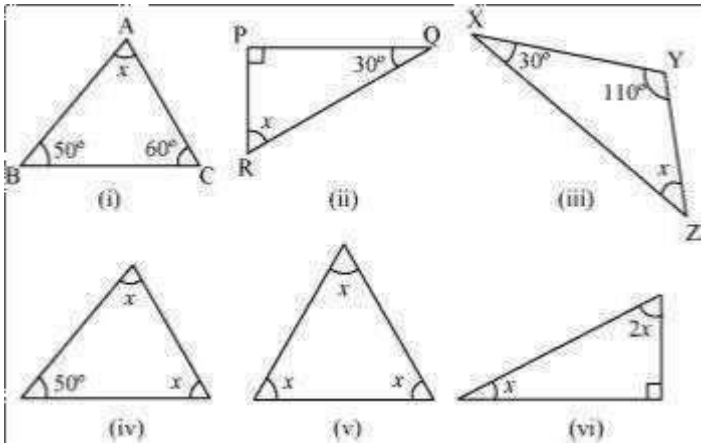
$x = 80° - 30° = 50°$

(vi) $x + 35° = 75°$ (Exterior angle theorem)
$x = 75º - 35º = 40°$

Exercise 6.3 : Solutions of Questions on Page Number: **121**

Q1 :

Find the value of the unknown *x* in the following diagrams:



Answer :

The sum of all interior angles of a triangle is 180°. By using this property, these problems can be solved as follows.

(i) $x + 50° + 60° = 180°$ x

$+ 110° = 180°$ $x = 180° -$

$110° = 70°$ (ii) $x + 90° +$

$30° = 180°$ $x + 120° =$

$180°$ $x = 180° - 120° =$

60° (iii) $x + 30° + 110° =$

$180° \; x + 140° = 180°$
$x = 180° - 140° = 40°$

(iv) $50° + x + x = 180°$

$50° + 2x = 180°$

$2x = 180° - 50° = 130°$

$$x = \frac{130°}{2} = 65°$$

(v) $x + x + x = 180°$

$3x = 180°$

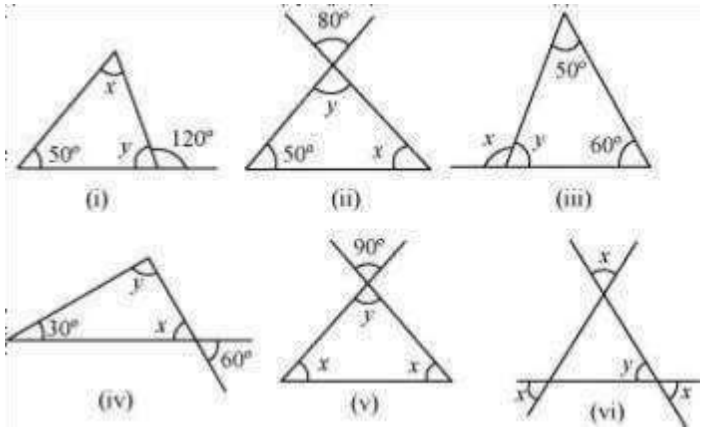
$$x = \frac{180}{3} = 60°$$

(vi) $x + 2x + 90° = 180°$

$3x = 180° - 90° = 90°$

$$x = \frac{90°}{3} = 30°$$

Q2 :
Find the value of the unknowns *x* and *y* in the following diagrams:



Answer :

(i) $y + 120° = 180°$ (Linear pair) y

$= 180° - 120° = 60° \; x + y + 50° = 180°$

(Angle sum property) $x + 60° + 50° =$

$180° \; x + 110° = 180° \; x = 180° - 110° =$

$70°$

(ii) $y = 80°$ (Vertically opposite angles) y

$+ x + 50° = 180°$ (Angle sum

property)

80° + x + 50° = 180° x

+ 130 ° = 180° x =

180° - 130 ° = 50°

(iii) y + 50° + 60° = 180° (Angle sum property) y = 180° - 60° - 50° = 70° x + y = 180°

(Linear pair) x = 180° - y = 180° - 70° = 110°

(iv) x = 60 ° (Vertically opposite angles)

30° + x + y = 180° 30° + 60° + y =

180° y = 180° - 30° - 60° = 90° (v) y =

90° (Vertically opposite angles) x + x +

y = 180° (Angle sum property)

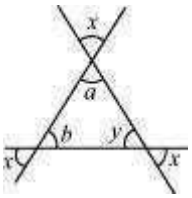
2x + y = 180° 2x +

90° = 180°

2x = 180° - 90° = 90°

$$x = \frac{90^\circ}{2} = 45^\circ$$

(vi)



y = x (Vertically opposite angles) a = x

(Vertically opposite angles) b = x

(Vertically opposite angles) a + b + y

= 180° (Angle sum property) x + x + x

= 180°

3x = 180°

$$x = \frac{180^\circ}{3} = 60^\circ$$

y = x = 60°

Exercise 6.4 : Solutions of Questions on Page Number: **126**

Q1 :

Is it possible to have a triangle with the following sides?

(i) 2 cm, 3 cm, 5 cm (ii) 3 cm, 6 cm, 7 cm

(iii) 6 cm, 3 cm, 2 cm

Answer :

In a triangle, the sum of the lengths of either two sides is always greater than the third side.

(i) Given that, the sides of the triangle are 2 cm, 3 cm, 5 cm.

It can be observed that,

2 + 3 = 5 cm

However, 5 cm = 5 cm

Hence, this triangle is not possible.

(ii) Given that, the sides of the triangle are 3 cm, 6 cm, 7 cm.

Here, 3 + 6 = 9 cm > 7 cm

6 + 7 = 13 cm > 3 cm 3 +

7 = 10 cm > 6 cm

Hence, this triangle is possible.

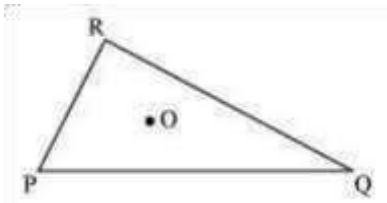
(iii) Given that, the sides of the triangle are 6 cm, 3 cm, 2 cm.

Here, 6 + 3 = 9 cm > 2 cm

However, 3 + 2 = 5 cm < 6 cm Hence, this triangle is not possible.

Q2 :

Take any point O in the interior of a triangle PQR. Is



(i) OP + OQ > PQ?

(ii) OQ + OR > QR?

(iii) OR + OP > RP?

Answer :

If O is a point in the interior of a given triangle, then three triangles ΔOPQ, ΔOQR, and ΔORP can be constructed. In a triangle, the sum of the lengths of either two sides is always greater than the third side.

(i) Yes, as ΔOPQ is a triangle with sides OP, OQ, and PQ.

OP + OQ > PQ

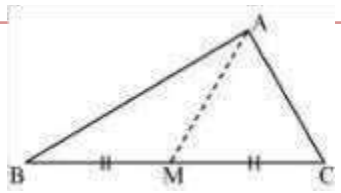
(ii) Yes, as ΔOQR is a triangle with sides OR, OQ, and QR.

OQ + OR > QR

(iii) Yes, as ΔORP is a triangle with sides OR, OP, and PR. OR + OP > PR

Q3 :

AM is a median of a triangle ABC. Is AB + BC + CA > 2 AM? (Consider the sides of triangles ΔABM and ΔAMC.)



Answer :

In a triangle, the sum of the lengths of either two sides is always greater than the third side.

In ΔABM,

AB + BM > AM (*i*)

Similarly, in ΔACM,

AC + CM > AM (*ii*)

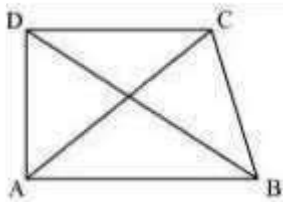
Adding equation (*i*) and (*ii*),

AB + BM + MC + AC > AM + AM

AB + BC + AC > 2AM Yes, the given expression is true.

Q4 :
ABCD is quadrilateral.

Is AB + BC + CD + DA >AC + BD?



Answer :

In a triangle, the sum of the lengths of either two sides is always greater than the third side.

Considering ΔABC,

AB + BC > CA (*i*)

In ΔBCD,

BC + CD > DB (*ii*)

In ΔCDA,

CD + DA > AC (*iii*)

In ΔDAB,

DA + AB > DB (*iv*)

Adding equations (*i*), (*ii*), (*iii*), and (*iv*), we obtain

AB + BC + BC + CD + CD + DA + DA + AB > AC + BD + AC + BD
2AB + 2BC + 2CD +2DA > 2AC + 2BD

2(AB + BC + CD + DA) > 2(AC + BD)

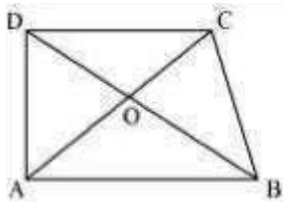
(AB + BC + CD + DA) > (AC + BD) Yes, the given expression is true.

Q5 :

ABCD is quadrilateral.

Is AB + BC + CD + DA < 2 (AC + BD)?

Answer :



In a triangle, the sum of the lengths of either two sides is always greater than the third side.

Considering ΔOAB,

OA + OB > AB (*i*)

In ΔOBC,

OB + OC > BC (*ii*)

In ΔOCD,

OC + OD > CD (*iii*)

In ΔODA,

OD + OA > DA (*iv*)

Adding equations (*i*), (*ii*), (*iii*), and (*iv*), we obtain

OA + OB + OB + OC + OC + OD + OD + OA > AB + BC + CD + DA

2OA + 2OB + 2OC + 2OD > AB + BC + CD + DA

2OA + 2OC + 2OB + 2OD > AB + BC + CD + DA

2(OA + OC) + 2(OB + OD) > AB + BC + CD + DA

2(AC) + 2(BD) > AB + BC + CD + DA

2(AC + BD) > AB + BC + CD + DA Yes, the given expression is true.

Q6 :

The lengths of two sides of a triangle are 12 cm and 15 cm. Between what two measures should the length of the third side fall?

Answer :

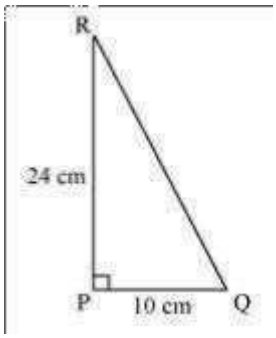
In a triangle, the sum of the lengths of either two sides is always greater than the third side and also, the difference of the lengths of either two sides is always lesser than the third side. Here, the third side will be lesser than the sum of these two (i.e., 12 + 15 = 27) and also, it will be greater than the difference of these two (i.e., 15 - 12 = 3). Therefore, those two measures are 27cm and 3 cm.

Exercise 6.5 : Solutions of Questions on Page Number: **130**

Q1 :

PQR is a triangle right angled at P. If PQ = 10 cm and PR = 24 cm, find QR.

Answer :



By applying Pythagoras theorem in ΔPQR,

$(PQ)^2 + (PR)^2 = (RQ)^2$

$(10)^2 + (24)^2 = RQ^2$

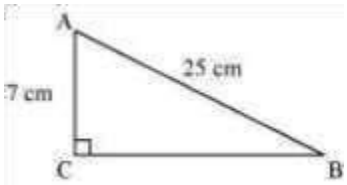
$100 + 576 = (QR)^2$

$676 = (QR)^2$ QR
= 26 cm

Q2 :

ABC is a triangle right angled at C. If AB = 25 cm and AC = 7 cm, find BC.

Answer :



By applying Pythagoras theorem in ΔABC,

$(AC)^2 + (BC)^2 = (AB)^2$

$(BC)^2 = (AB)^2 - (AC)^2$

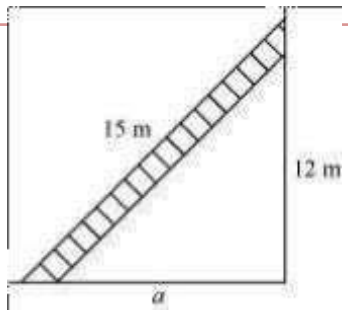
$(BC)^2 = (25)^2 - (7)^2$

$(BC)^2 = 625 - 49 = 576$

BC = 24 cm

Q3 :

A 15 m long ladder reached a window 12 m high from the ground on placing it against a wall at a distance *a*. Find the distance of the foot of the ladder from the wall.



Answer :

By applying Pythagoras theorem,

$(15)^2 = (12)^2 + a^2$

$225 = 144 + a^2$ $a^2 =$

$225 - 144 = 81$ $a = 9$

m

Therefore, the distance of the foot of the ladder from the wall is 9 m.

Q4 :

Which of the following can be the sides of a right triangle?

(i) 2.5 cm, 6.5 cm, 6 cm

(ii) 2 cm, 2 cm, 5 cm

(iii) 1.5 cm, 2 cm, 2.5 cm

In the case of right-angled triangles, identify the right angles.

Answer :

(i) 2.5 cm, 6.5 cm, 6 cm

$(2.5)^2 = 6.25$

$(6.5)^2 = 42.25$

$(6)^2 = 36$

It can be observed that,

36 + 6.25 = 42.25

$(6)^2 + (2.5)^2 = (6.5)^2$

The square of the length of one side is the sum of the squares of the lengths of the remaining two sides. Hence, these are the sides of a right-angled triangle. Right angle will be in front of the side of 6.5 cm measure. (ii) 2 cm, 2 cm, 5 cm

$(2)^2 = 4$

$(2)^2 = 4$

$(5)^2 = 25$

Here, $(2)^2 + (2)^2 \neq (5)^2$

The square of the length of one side is not equal to the sum of the squares of the lengths of the remaining two sides. Hence, these sides are not of a right-angled triangle.

(iii) 1.5 cm, 2 cm, 2.5 cm

$(1.5)^2 = 2.25$

$(2)^2 = 4$

$(2.5)^2 = 6.25$

Here,

2.25 + 4 = 6.25

$(1.5)^2 + (2)^2 = (2.5)^2$

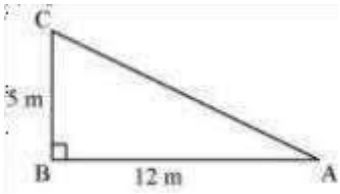
The square of the length of one side is the sum of the squares of the lengths of the remaining two sides. Hence, these are the sides of a right-angled triangle.

Right angle will be in front of the side of 2.5 cm measure.

Q5 :

A tree is broken at a height of 5 m from the ground and its top touches the ground at a distance of 12 m from the base of the tree. Find the original height of the tree.

Answer :



In the given figure, BC represents the unbroken part of the tree. Point C represents the point where the tree broke and CA represents the broken part of the tree. Triangle ABC, thus formed, is right-angled at B.

Applying Pythagoras theorem in ΔABC,

$AC^2 = BC^2 + AB^2$

$AC^2 = (5\ m)^2 + (12\ m)^2$

$AC^2 = 25\ m^2 + 144\ m^2 = 169\ m^2$

AC = 13 m

Thus, original height of the tree = AC + CB = 13 m + 5 m = 18 m

Q6 :

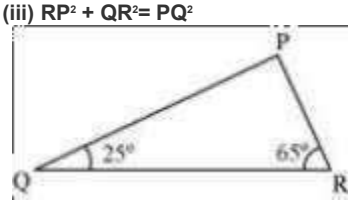
Angles Q and R of a ΔPQR are 25° and 65°.

Write which of the following is true:

(i) $PQ^2 + QR^2 = RP^2$

(ii) $PQ^2 + RP^2 = QR^2$

(iii) $RP^2 + QR^2 = PQ^2$



Answer :

The sum of the measures of all interior angles of a triangle is 180º.

$\angle PQR + \angle PRQ + \angle QPR = 180^\circ$

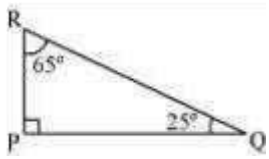
$25^\circ + 65^\circ + \angle QPR = 180^\circ$

$90^\circ + \angle QPR = 180^\circ$

$\angle QPR = 180^\circ - 90^\circ = 90^\circ$

Therefore, Δ PQR is right-angled at point P.

Hence, $(PR)^2 + (PQ)^2 = (QR)^2$

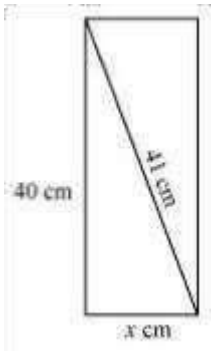


Thus, (ii) is true.

Q7 :

Find the perimeter of the rectangle whose length is 40 cm and a diagonal is 41 cm.

Answer :



In a rectangle, all interior angles are of 90º measure. Therefore, Pythagoras theorem can be applied here.

$(41)^2 = (40)^2 + x^2$ 1681

$= 1600 + x^2$ $x^2 = 1681$

$1600 = 81$ $x = 9$ cm

Perimeter = 2(Length + Breadth)

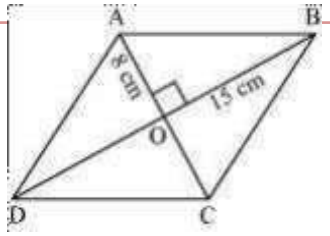
$= 2(x + 40)$

$= 2 (9 + 40)$
$= 98$ cm

Q8 :

The diagonals of a rhombus measure 16 cm and 30 cm. Find its perimeter.

Answer :



Let ABCD be a rhombus (all sides are of equal length) and its diagonals, AC and BD, are intersecting each other at point O. Diagonals in a rhombus bisect each other at 90 º. It can be observed that

$$AO = \frac{AC}{2} = \frac{16}{2} = 8 \text{ cm}$$

$$BO = \frac{BD}{2} = \frac{30}{2} = 15 \text{ cm}$$

By applying Pythagoras theorem in ΔAOB,

$OA^2 + OB^2 = AB^2$

$8^2 + 15^2 = AB^2$

$64 + 225 = AB^2$

$289 = AB^2$

$AB = 17$

Therefore, the length of the side of rhombus is 17 cm.

Perimeter of rhombus = 4 × Side of the rhombus = 4 × 17 = 68 cm

NCERT Solutions for Class 7 Maths Chapter 7

Congruence of Triangles Class 7

Chapter 7 Congruence of Triangles Exercise 7.1, 7.2 Solutions

Exercise 7.1 : Solutions of Questions on Page Number: **137**

Q1 :

Complete the following statements:

(a) Two line segments are congruent if_____.

(b) Among two congruent angles, one has a measure of 70°; the measure of the other angle is_____.

(c) When we write ∠A = ∠B, we actually mean_____.

Answer :

(a) They have the same length

(b) 70°

(c) m ∠A = m ∠B

Q2 :

Give any two real-life examples for congruent shapes.

Answer :

(i) Sheets of same letter pad (ii)
Biscuits in the same packet

Q3 :

If ΔABC ≅ ΔFED under the correspondence ABC Ã¢â€ â€ FED, write all the Corresponding congruent parts of the triangles.

Answer :

If these triangles are congruent, then the corresponding angles and sides will be equal to each other.

$\angle A \leftrightarrow \angle F$

$\angle B \leftrightarrow \angle E$

$\angle C \leftrightarrow \angle D$

$\overline{AB} \leftrightarrow \overline{FE}$

$\overline{BC} \leftrightarrow \overline{ED}$

$\overline{CA} \leftrightarrow \overline{DF}$

Q4 :
If ΔDEF ≅ ΔBCA, write the part(s) of ΔBCA that correspond to

(i) $\overline{EF}$ (ii) $\overline{DF}$ (iii) ∠F (iv)

Answer :

(i) $\overline{BC}$

(ii) $\overline{CA}$

(iii) ∠A

(iv) $\overline{BA}$

Exercise 7.2 : Solutions of Questions on Page Number: **149**

Q1 :

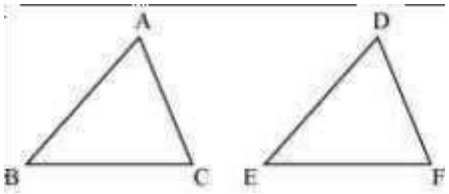
Which congruence criterion do you use in the following?

(a) Given: AC = DF

AB = DE

BC = EF

So, ΔABC ≅ ΔDEF

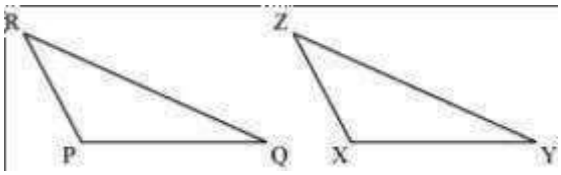


(b) Given: ZX = RP

RQ = ZY

∠PRQ = ∠XZY

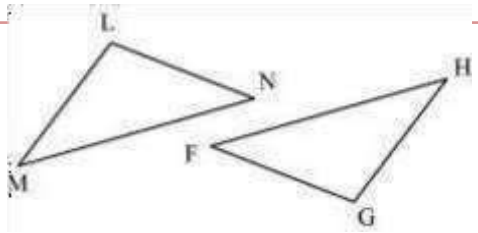
So, ΔPQR ≅ ΔXYZ



(c) Given: ∠MLN = ∠FGH ∠NML = ∠GFH

ML = FG

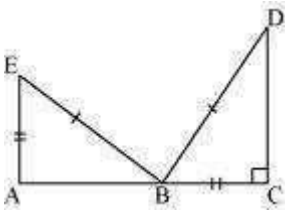
So, ΔLMN ≅ ΔGFH



(d) Given: EB = DB AE = BC

∠A = ∠C = 90°

So, ΔABE ≅ ΔCDB



Answer :

(a) SSS, as the sides of ΔABC are equal to the sides of ΔDEF.

(b) SAS, as two sides and the angle included between these sides of ΔPQR are equal to two sides and the angle included between these sides of ΔXYZ. (c) ASA, as two angles and the side included between these angles of ΔLMN are equal to two angles and the side included between these angles of ΔGFH.

(d) RHS, as in the given two right-angled triangles, one side and the hypotenuse are respectively equal.

Q2 :

You want to show that ΔART ≅ΔPEN,

(a) If you have to use SSS criterion, then you need to show

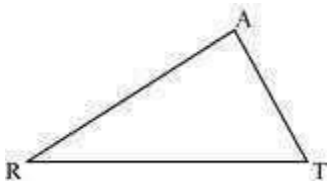
(i) AR = (ii) RT = (iii) AT =

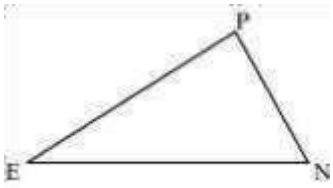
(b) If it is given that ∠T = ∠N and you are to use SAS criterion, you need to have

(i) RT = and (ii) PN =

(c) If it is given that AT = PN and you are to use ASA criterion, you need to have

(i) ? (ii) ?





Answer :
(a)
(i) AR = PE

(ii) RT = EN

(iii) AT = PN

(b)

(i) RT = EN

(ii) PN = AT

(c)

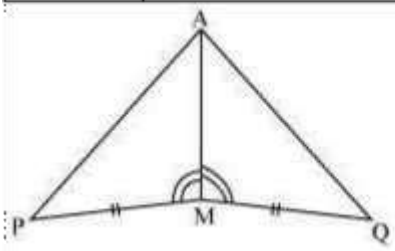
(i) $\triangle ATR = \triangle PNE$ (ii) $\angle RAT = \angle EPN$

Q3 :

You have to show that $\Delta AMP \cong AMQ$.

In the following proof, supply the missing reasons.

-	Steps	-	Reasons
(i)	PM = QM	(i)	…
(ii)	∠PMA = ∠QMA	(ii)	…
(iii)	AM = AM	(iii)	…
(iv)	$\Delta AMP \cong \Delta AMQ$	(iv)	…



Answer :

(i) Given

(ii) Given

(iii) Common

(iv) SAS, as the two sides and the angle included between these sides of ΔAMP are equal to two sides and the angle included between these sides of ΔAMQ.

Q4 :

In $\triangle ABC$, A = 30°, B = 40° and C = 110°

In $\triangle PQR$, P = 30°, Q = 40° and R = 110° A student says that $\Delta ABC \sim \Delta PQR$ by AAA congruence criterion. Is he justified? Why or why not?

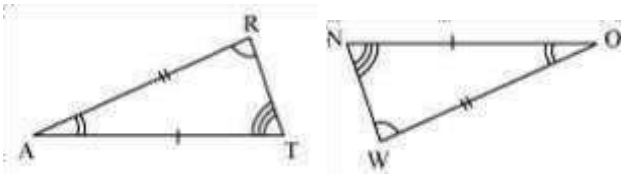
Answer :

No. This property represents that these triangles have their respective angles of equal measure. However, this gives no information about their sides. The sides of these triangles have a ratio somewhat different than 1:1. Therefore, AAA property does not prove the two triangles congruent.

Q5 :

In the figure, the two triangles are congruent.

The corresponding parts are marked. We can write ΔRAT ?



≅

Answer :

It can be observed that,

∠RAT = ∠WON

∠ART = ∠WN AR
= OW

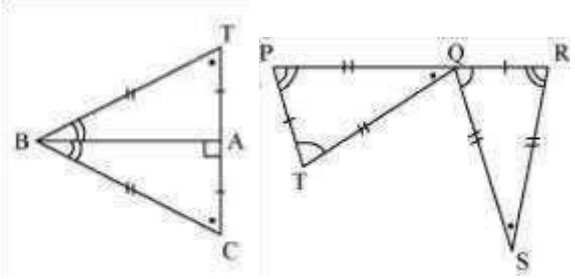
Therefore, ΔRAT ≅ ΔWON, by ASA criterion.

Q6 :

Complete the congruence statement:

ΔBCA ≅?

ΔQRS ?



≅

Answer :

Given that, BC = BT

TA = CA

BA is common.

Therefore, ΔBCA ≅ ΔBTA

Similarly, PQ = RS
TQ = QS PT
= RQ

Therefore, ΔQRS ≅ ΔTPQ

Q7 :

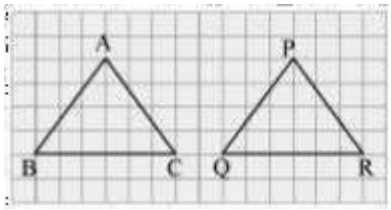
In a squared sheet, draw two triangles of equal areas such that (i) The triangles are congruent.

(ii) The triangles are not congruent.

What can you say about their perimeters?

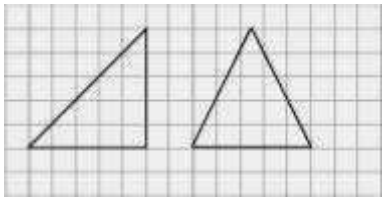
Answer :

(i)



Here, ΔABC and ΔPQR have the same area and are congruent to each other also. Also, the perimeter of both the triangles will be the same.

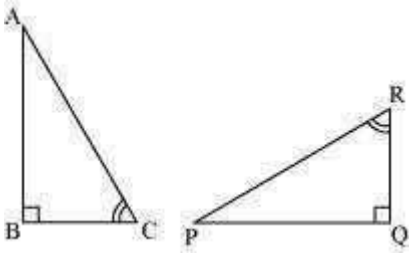
(ii)



Here, the two triangles have the same height and base. Thus, their areas are equal. However, these triangles are not congruent to each other. Also, the perimeter of both the triangles will not be the same.

Q8 :

If ΔABC and ΔPQR are to be congruent, name one additional pair of corresponding parts. What criterion did you use?



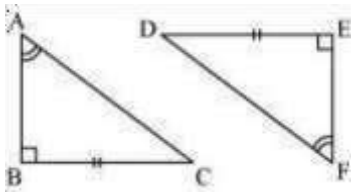
Answer :

BC = QR

ΔABC $\cong$ ΔPQR (ASA criterion)

Q9 : Explain, why

ΔABC ≅ ΔFED



Answer :

Given that, $\angle ABC = \angle FED$ (1) $\angle BAC = \angle EFD$ (2)

The two angles of ΔABC are equal to the two respective angles of ΔFED. Also, the sum of all interior angles of a triangle is 180º.

Therefore, third angle of both triangles will also be equal in measure. $\angle BCA = \angle EDF$ (3)

Also, given that, BC = ED (4)

By using equation (1), (3), and (4), we obtain

ΔABC ≅ ΔFED (ASA criterion)

NCERT Solutions for Class 7 Maths Chapter 8

Comparing Quantities Class 7

Chapter 8 Comparing Quantities Exercise 8.1, 8.2, 8.3 Solutions

Exercise 8.1 : Solutions of Questions on Page Number: **157**

Q1 :

Find the ratio of:

(a) Rs 5 to 50 paise (b) 15 kg to 210 g

(c) 9 m to 27 cm (d) 30 days to 36 hours

Answer :

(a) Rs 5 to 50 paise

1 rupee = 100 paise 5 rupee

= 500 paise

$$\therefore \frac{\text{Rs } 5}{50 \text{ paise}} = \frac{500}{50} = \frac{10}{1}$$

Hence, the required ratio is 10:1.

(b) 15 kg to 210 g

1 kg = 1000 g

15 kg = 15000 g

$$\Rightarrow \frac{15 \text{ kg}}{210 \text{ g}} = \frac{15000}{210} = \frac{500}{7}$$

Hence, the required ratio is 500:7.

(c) 9 m to 27 cm

1 m = 100 cm

9 m = 900 cm

$$\Rightarrow \frac{9 \text{ cm}}{27 \text{ cm}} = \frac{900}{27} = \frac{100}{3}$$

Hence, the required ratio is 100:3.

(d) 30 days to 36 hours

1 days = 24 hrs

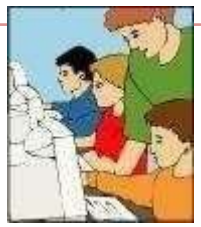
30 days = 24 × 30 = 720 hrs

$$\Rightarrow \frac{30 \text{ days}}{36 \text{ hrs}} = \frac{720}{36} = \frac{20}{1}$$

Hence, the required ratio is 20:1.

Q2 :

In a computer lab, there are 3 computers for every 6 students. How many computers will be needed for 24 students?



Answer :

For 6 students, number of computers required = 3

For 1 student, number of computers required = $\frac{3}{6}=\frac{1}{2}$

$\therefore$ For 24 students, number of computers required = $24\times\frac{1}{2}$ = 12 Hence, 12 computers are required for 24 students.

Q3 :

Population of Rajasthan = 570 lakhs and population of UP = 1660 lakhs.

Area of Rajasthan = 3 lakh km² and area of UP = 2 lakh km².

(i) How many people are there per km² in both these States?

(ii) Which State is less populated?

Answer :

(i) Population of Rajasthan in 3 km² area = 570 lakh

Population of Rajasthan in 1 km² area = $\frac{570}{3}=190$ lakh

Population of U.P in 2 km² area = 1660 lakh

Population of U.P in 1 km² area = $\frac{1660}{2}$ = 830 lakh

(ii) It can be observed that population per km² area is lesser for Rajasthan. Therefore, Rajasthan is less populated.

Q1 :

Exercise 8.2 : Solutions of Questions on Page Number: **164**

Convert the given fractional numbers to per cents.

(a) $\frac{1}{8}$ (b) $\frac{5}{4}$

(c) $\frac{3}{40}$ (d) $\frac{2}{7}$

Answer :

(a)

$$\frac{1}{8}=\frac{1}{8}\times\frac{100}{100}$$
$$=\frac{1}{8}\times 100\ \%$$
$$=12.5\%$$

(b) $\frac{5}{4}$

$$\frac{5}{4}=\frac{5}{4}\times\frac{100}{100}$$
$$=\frac{500}{4}\ \%=125\ \%$$

(c) $\frac{3}{40}$

$$\frac{3}{40}=\frac{3}{40}\times\frac{100}{100}$$
$$=\frac{300}{40}\ \%=7.5\ \%$$

(d) $\frac{2}{7}$

$$\frac{2}{7}=\frac{2}{7}\times\frac{100}{100}=\frac{200}{7}\ \%=28\frac{4}{7}\ \%$$

Q2 :

Convert the given decimal fractions to per cents.

(a) 0.65 (b) 2.1 (c) 0.02 (d) 12.35

Answer :

(a) 0.65

$$0.65 = 0.65 \times 100\ \% = \frac{65 \times 100}{100}\ \% = 65\%$$

(b) 2.1

$$2.1 = 2.1 \times 100\ \% = \frac{21 \times 100}{10}\ \% = 210\%$$

(c) 0.02

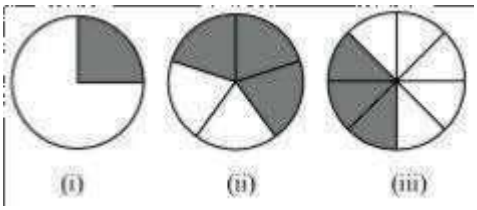
$$0.02 = 0.02 \times 100\ \% = \frac{2 \times 100}{100}\ \% = 2\%$$

(d) 12.35

$$12.35 = 12.35 \times 100\ \% = \frac{1235 \times 100}{100}\ \% = 1235\ \%$$

Q3 :

Estimate what part of the figures is coloured and hence find the per cent which is coloured.

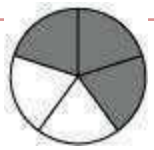


Answer :

(i) Here, 1 part out of 4 equal parts are shaded which represents the fraction $\frac{1}{4}$.

$$\frac{1}{4} = \frac{1}{4} \times 100\ \% = 25\ \%$$

(ii) Here, 3 parts out of 5 equal parts are shaded which represents the fraction $\frac{3}{5}$.



$$\frac{3}{5}=\frac{3}{5}\times 100\ \%=60\ \%$$

(iii) Here, 3 parts out of 8 equal parts are shaded which represents the fraction $\frac{3}{8}$.

$$\frac{3}{8}=\frac{3}{8}\times 100\ \%=\frac{300}{8}\ \%=37.5\ \%$$

Q4 :
Find:

(a) 15% of 250 (b) 1% of 1 hour (c)
20% of Rs 2500 (d) 75% of 1 kg
Q5 :

Answer :

(a) $15\%\text{ of }250=\frac{15}{100}\times 250=\frac{75}{2}=37.5$

(b) 1 hour = 60 minutes

$$1\%\text{ of }60\text{ minutes}=\frac{1}{100}\times 60=\frac{3}{5}\text{minutes}$$

(c) $20\%\text{ of Rs }2500=\frac{20}{100}\times 2500=\text{Rs }500$

(d) $75\%\text{ of }1\text{ kg}=\frac{75}{100}\times 1=0.75\text{ kg}=(0.75\times 1000)\text{ g}=750\text{ g}$

Find the whole quantity if

(a) 5% of it is 600 (b) 12% of it is 1080

(c) 40% of it is 500 km (d) 70% of it is 14 minutes

(e) 8% of it is 40 litres

Answer :

(a) 5% of x = 600

$$\frac{5}{100} \times x = 600$$

$$\therefore x = 600 \times \frac{100}{5} = 12000$$

(b) 12% of x = Rs 1080

$$\frac{12}{100} \times x = \text{Rs}1080$$

$$\therefore x = \text{Rs}1080 \times \frac{100}{12} = \text{Rs } 9000$$

(c) 40% of x = 500 km

$$\frac{40}{100} \times x = 500 \text{ km}$$

$$\therefore x = 500 \times \frac{100}{40} = 1250 \text{ km}$$

(d) 70% of x = 14 min

$$x \times \frac{70}{100} = 14 \text{ min}$$

$$\therefore x = 14 \times \frac{100}{70} = 20 \text{ min}$$

(e) 8% of x = 40 L

$$\therefore x \times \frac{8}{100} = 40 \text{ L}$$

$$\therefore x = 40 \times \frac{100}{8}$$

= 500 L

Q6 :

Convert given percents to decimal fractions and also to fractions in simplest forms:

(a) 25% (b) 150%

(c) 20% (d) 5%

Answer :

(a) 25% $= \frac{25}{100} = \frac{1}{4} = 0.25$

(b) 150% $= \frac{150}{100} = 1.5 = \frac{3}{2}$

(c) 20% $= \frac{20}{100} = 0.2 = \frac{1}{5}$

(d) 5% $= \frac{5}{100} = 0.05 = \frac{1}{20}$

Q7 :
In a city, 30% are females, 40% are males and remaining are children. What per cent are children?

Answer :

It is given that 30% are females and 40% are males.

Children = (100 - 30 - 40) % = 30%

Q8 :
Out of 15, 000 voters in a constituency, 60% voted. Find the percentage of voters who did not vote. Can you now find how many actually did not vote?

Answer :

Percentage of voters who voted = 60%

Percentage of those who did not vote = 100% - 60% = 40%

Number of people who did not vote = 40% of 15000

$= \frac{40}{100} \times 15000 = 6000$

Therefore, 6000 people did not vote.

Q9 :
Meeta saves Rs 400 from her salary. If this is 10% of her salary. What is her salary?

Answer :

Let Meeta's salary be Rs *x*.

Given that,

10% of *x* = 400

$$\frac{10}{100} \times x = 400$$

$$\frac{x}{10} = 400$$

x = 400 × 10 = Rs 4000

Therefore, Meeta's salary is Rs 4000.

Q10 :

A local cricket team played 20 matches in one season. It won 25% of them. How many matches did they win?

Answer :

Number of games won = 25% of 20

$$= \frac{25}{100} \times 20 = 5$$

Therefore, the team won 5 matches.

Q1

:

Exercise 8.3 : Solutions of Questions on Page Number: **171**

Tell what is the profit or loss in the following transactions. Also find profit percent or loss percent in each case.

(a) Gardening shears bought for Rs 250 and sold for Rs 325.

(b) A refrigerator bought for Rs 12,000 and sold at Rs 13,500.

(c) A cupboard bought for Rs 2,500 and sold at Rs 3,000.

(d) A skirt bought for Rs 250 and sold at Rs 150.

Answer :

(a) Cost price = Rs 250

Selling price = Rs 325

Profit = 325 - 250 = Rs 75

$$\text{Profit \%} = \frac{\text{Profit}}{\text{CP}} \times 100$$

$$= \frac{75}{250} \times 100 = 30\%$$

(b) Cost price = Rs 12000

Selling price = Rs 13,500

Profit = 13500 - 12000 = Rs 1500

$$\text{Profit \%} = \frac{\text{Profit}}{\text{CP}} \times 100$$

$$\text{Profit \%} = \frac{1500}{12000} \times 100 = 12.5\%$$

(c) Cost price = Rs 2500

Selling price = Rs 3000

Profit = 3000 - 2500 = Rs 500

$$\text{Profit \%} = \frac{\text{Profit}}{\text{CP}} \times 100$$

$$\text{Profit \%} = \frac{500}{2500} \times 100 = 20\%$$

(d) Cost price = Rs 250

Selling price = Rs 150

Loss = 250 - 150 = Rs 100

$$\text{Loss \%} = \frac{\text{Loss}}{\text{CP}} \times 100$$

$$\text{Loss \%} = \frac{100}{250} \times 100 = 40\%$$

Q2 :

Convert each part of the ratio to percentage:

(a) 3:1 (b) 2:3:5 (c) 1:4 (d) 1:2:5

Answer :

(a) 3: 1

Total parts = 3 + 1 = 4

1st part $= \frac{3}{4} = \frac{3}{4} \times 100\% = 75\%$

2nd part = $\frac{1}{4} = \frac{1}{4} \times 100\% = 25\%$

(b) 2: 3: 5

Total parts = 2 + 3 + 5 = 10

1st part = $\frac{2}{10}=\frac{2}{10}\times 100\%=20\%$

2nd part = $\frac{3}{10}=\frac{3}{10}\times 100\%=30\%$

3rd part = $\frac{5}{10}=\frac{5}{10}\times 100\%=50\%$

(c) 1: 4

Total parts =1 + 4 = 5

1st part = $\frac{1}{5}=\frac{1}{5}\times 100\%=20\%$

2nd part = $\frac{4}{5}=\frac{4}{5}\times 100\%=80\%$

(d) 1: 2: 5

Total parts = 1 + 2 + 5 = 8

1st part = $\frac{1}{8}=\frac{1}{8}\times 100\%=12.5\%$

2nd part = $\frac{2}{8}=\frac{2}{8}\times 100\%=25\%$

3rd = $\frac{5}{8}=\frac{5}{8}\times 100\%=62.5\%$

Q3 :

The population of a city decreased from 25,000 to 24,500. Find the percentage decrease.

Answer :

Initial population = 25000

Final population = 24500

Decrease = 500

% decrease = $\frac{500}{25000}\times 100=2\%$

Q4 :

Arun bought a car for Rs 3,50,000. The next year, the price went upto Rs 3,70,000. What was the percentage of price increase?

Answer :

Initial price = Rs 350000

Final price = Rs 370000

Increase = Rs 20000

% increase = $\frac{20000}{350000} \times 100$

= $5\frac{5}{7}$ %

Q5 :

I buy a T.V. for Rs 10,000 and sell it at a profit of 20%. How much money do I get for it?

Answer :

Cost price = Rs 10000 Profit
= 20% of 10000

$= \frac{20}{100} \times 10000$

= Rs 2000
Selling price = Cost price + Profit

= 10000 + 2000 = Rs 12,000

Q6 :

Juhi sells a washing machine for Rs 13, 500. She loses 20% in the bargain. What was the price at which she bought it?

Answer :

Selling price = Rs 13500

Loss % = 20%

Let the cost price be *x*.

Loss = 20% of *x*

Cost price - Loss = Selling price

$$x - \frac{20}{100} \times x = 13500$$

$$x - \frac{1}{5}x = 13500$$

$$\frac{4}{5}x = 13500$$

$$x = 13500 \times \frac{5}{4}$$

= 16875

Therefore, she bought it for Rs 16875.

Q7 :

(i) Chalk contains calcium, carbon and oxygen in the ratio 10:3:12. Find the percentage of carbon in chalk.

(ii) If in a stick of chalk, carbon is 3g, what is the weight of the chalk stick?

Answer :

(i) Ratio of calcium, carbon, and oxygen = 10: 3: 12

As 10 + 3 +12 = 25,

Therefore, percentage of carbon = $\frac{3}{25} \times 100$ = 12%

(ii) Let the weight of the stick be *x* g.

12 % of *x* = 3

$$\frac{12}{100} \times x = 3$$

$$x = 3 \times \frac{100}{12} = 25 \text{ g}$$

Q8 :

Amina buys a book for Rs 275 and sells it at a loss of 15%. How much does she sell it for?

Answer :

Cost price = Rs 275

Loss % = 15%

Loss = 15% of 275

Cost price - Loss = Selling price

$$275 - \frac{15}{100} \times 275 = \text{Selling price}$$

$$275 - \frac{4125}{100} = \text{Selling price}$$

275 - 41.25 = Selling price

Selling price = Rs 233.75

Q9 :

Find the amount to be paid at the end of 3 years in each case:

(a) Principal = Rs 1,200 at 12% p.a.

(b) Principal = Rs 7,500 at 5% p.a.

Answer :

(a) Principa

l (P) =

Rs 1200

Rate (R) = 12 % p.a.

Time (T) = 3 years

$$S.I. = \frac{P \times R \times T}{100}$$
$$= \frac{1200 \times 12 \times 3}{100}$$

= Rs 432

Amount = P + S.I.

= 1200 + 432

= Rs 1632

(b) P = Rs

7500 R = 5% p.a.

T = 3 years

$$S.I. = \frac{P \times R \times T}{100}$$
$$= \frac{7500 \times 5 \times 3}{100}$$

= Rs 1125

Amount = 7500 + 1125

= Rs 8625

Q10 :

What rate gives Rs 280 as interest on a sum of Rs 56,000 in 2 years?

Answer :

$$S.I = \frac{P \times R \times T}{100}$$
$$280 = \frac{56000 \times R \times 2}{100}$$
$$R = \frac{280}{560 \times 2} = \frac{1}{4} = 0.25$$

Therefore, 0.25% gives Rs 280 as interest on the given sum.

Q11 :

If Meena gives an interest of Rs 45 for one year at 9% rate p.a.. What is the sum she has borrowed?

Answer :

$$S.I = \frac{P \times R \times T}{100}$$

$$45 = \frac{P \times 9 \times 1}{100}$$

$$P = \frac{45 \times 100}{9}$$

= Rs 500

Therefore, she borrowed Rs 500.

NCERT Solutions for Class 7 Maths Chapter 9

Rational Numbers Class 7

Chapter 9 Rational Numbers Exercise 9.1, 9.2 Solutions

Exercise 9.1 : Solutions of Questions on Page Number: **182**

Q1 :

List five rational numbers between:

(i) - 1 and 0 (ii) - 2 and - 1

(iii) $\frac{-4}{5}$ and $\frac{-2}{3}$ **(iv)** $\frac{1}{2}$ and $\frac{2}{3}$

Answer :

(i) - 1 and 0

$$\frac{-1}{10}, \frac{-1}{20}, \frac{-1}{30}, \frac{-1}{40}, \frac{-1}{50}$$

(ii) - 2 and - 1

$$-2 = \frac{-12}{6} \text{ and } -1 = \frac{-6}{6}$$

Five rational numbers are

$$\frac{-11}{6}, \frac{-10}{6}, \frac{-9}{6}, \frac{-8}{6}, \frac{-7}{6}$$

(iii) $\frac{-4}{5}$ and $\frac{-2}{3}$

$$\frac{-4}{5} = \frac{-4\times9}{5\times9} = \frac{-36}{45} \text{ and } \frac{-2}{3} = \frac{-2\times15}{3\times15} = \frac{-30}{45}$$

Five rational numbers are

$$\frac{-35}{45}, \frac{-34}{45}, \frac{-33}{45}, \frac{-32}{45}, \frac{-31}{45}$$

(iv) $\frac{1}{2}$ and $\frac{2}{3}$

$$\frac{1}{2} = \frac{1\times18}{2\times18} = \frac{18}{36} \text{ and } \frac{2}{3} = \frac{2\times12}{3\times12} = \frac{24}{36}$$

Five rational numbers are

$$\frac{19}{36}, \frac{20}{36}, \frac{21}{36}, \frac{22}{36}, \frac{23}{36}$$

Q2 :

Write four more rational numbers in each of the following patterns:

(i) $\frac{-3}{5}, \frac{-6}{10}, \frac{-9}{15}, \frac{-12}{20}, \ldots$ (ii) $\frac{-1}{4}, \frac{-2}{8}, \frac{-3}{12}, \ldots$

(iii) $\frac{-1}{6}, \frac{2}{-12}, \frac{3}{-18}, \frac{4}{-24}, \ldots$ (iv) $\frac{-2}{3}, \frac{2}{-3}, \frac{4}{-6}, \frac{6}{-9}, \ldots$

Answer :

(i) $\frac{-3}{5}, \frac{-6}{10}, \frac{-9}{15}, \frac{-12}{20} \ldots$

$\frac{-3}{5}, \frac{-3\times2}{5\times2}, \frac{-3\times3}{5\times3}, \frac{-3\times4}{5\times4} \ldots$

It can be observed that the numerator is a multiple of 3 while the denominator is a multiple of 5 and as we increase them further, these multiples are increasing. Therefore, the next four rational numbers in this pattern are

$\frac{-3\times5}{5\times5}, \frac{-3\times6}{5\times6}, \frac{-3\times7}{5\times7}, \frac{-3\times8}{5\times8} \ldots$

$\frac{-15}{25}, \frac{-18}{30}, \frac{-21}{35}, \frac{-24}{40} \ldots$

(ii)

$\frac{-1}{4}, \frac{-2}{8}, \frac{-3}{12} \ldots$

$\frac{-1}{4}, \frac{-1\times2}{4\times2}, \frac{-1\times3}{4\times3} \ldots$

The next four rational numbers in this pattern are

$\frac{-1\times4}{4\times4}, \frac{-1\times5}{4\times5}, \frac{-1\times6}{4\times6}, \frac{-1\times7}{4\times7} \ldots$

$\frac{-4}{16}, \frac{-5}{20}, \frac{-6}{24}, \frac{-7}{28} \ldots$

(iii)

$\frac{-1}{6}, \frac{2}{-12}, \frac{3}{-18}, \frac{4}{-24} \ldots$

$\frac{-1}{6}, \frac{1\times2}{-6\times2}, \frac{1\times3}{-6\times3}, \frac{1\times4}{-6\times4} \ldots$

The next four rational numbers in this pattern are

$\frac{1\times5}{-6\times5}, \frac{1\times6}{-6\times6}, \frac{1\times7}{-6\times7}, \frac{1\times8}{-6\times8} \ldots$

$\frac{5}{-30}, \frac{6}{-36}, \frac{7}{-42}, \frac{8}{-48} \ldots$

(iv) $\frac{-2}{3}, \frac{2}{-3}, \frac{4}{-6}, \frac{6}{-9} \ldots$

$\frac{-2}{3}, \frac{2}{-3}, \frac{2\times 2}{-3\times 2}, \frac{2\times 3}{-3\times 3} \ldots$

The next four rational numbers in this pattern are

$\frac{2\times 4}{-3\times 4}, \frac{2\times 5}{-3\times 5}, \frac{2\times 6}{-3\times 6}, \frac{2\times 7}{-3\times 7} \ldots$

$\frac{8}{-12}, \frac{10}{-15}, \frac{12}{-18}, \frac{14}{-21} \ldots$

Q3 :

Give four rational numbers equivalent to:

(i) $\frac{-2}{7}$ (ii) $\frac{5}{-3}$ (iii) $\frac{4}{9}$

Answer :

(i) $\frac{-2}{7}$

Four rational numbers are

$\frac{-2\times2}{7\times2}, \frac{-2\times3}{7\times3}, \frac{-2\times4}{7\times4}, \frac{-2\times5}{7\times5}$

$\frac{-4}{14}, \frac{-6}{21}, \frac{-8}{28}, \frac{-10}{35}$

(ii) $\frac{5}{-3}$

Four rational numbers are

$\frac{5\times2}{-3\times2}, \frac{5\times3}{-3\times3}, \frac{5\times4}{-3\times4}, \frac{5\times5}{-3\times5}$

$\frac{10}{-6}, \frac{15}{-9}, \frac{20}{-12}, \frac{25}{-15}$

(iii) $\frac{4}{9}$

Four rational numbers are

$\frac{4\times2}{9\times2}, \frac{4\times3}{9\times3}, \frac{4\times4}{9\times4}, \frac{4\times5}{9\times5}$

$\frac{8}{18}, \frac{12}{27}, \frac{16}{36}, \frac{20}{45}$

Q4 :

Draw the number line and represent the following rational numbers on it:

(i) $\frac{3}{4}$ **(ii)** $\frac{-5}{8}$

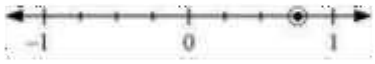
(iii) $\frac{-7}{4}$ **(iv)** $\frac{7}{8}$

Answer :

(i) $\frac{3}{4}$

This fraction represents 3 parts out of 4 equal parts. Therefore, each space between two integers on number line must be divided into 4 equal parts.

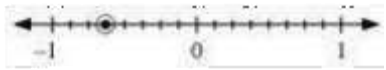
$\frac{3}{4}$ can be represented as



(ii) $\frac{-5}{8}$

This fraction represents 5 parts out of 8 equal parts. Negative sign represents that it is on the negative side of number line. Therefore, each space between two integers on number line must be divided into 8 equal parts.

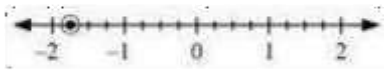
$\frac{-5}{8}$ can be represented as



(iii) $\frac{-7}{4} = -1\frac{3}{4}$

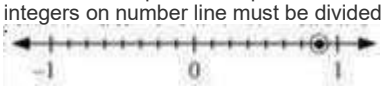
This fraction represents 1 full part and 3 parts out of 4 equal parts. Negative sign represents that it is on the negative side of number line. Therefore, each space between two integers on number line must be divided into 4 equal parts.

$\frac{-7}{4}$ can be represented as



(iv) $\frac{7}{8}$

This fraction represents 7 parts out of 8 equal parts. Therefore, each space between two integers on number line must be divided into 8 equal parts.

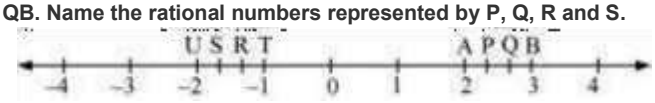


$\frac{7}{8}$ can be represented as

Q5 :

The points P, Q, R, S, T, U, A and B on the number line are such that,

TR = RS = SU and AP = PQ = QB. Name the rational numbers represented by P, Q, R and S.



Answer :

Distance between U and T = 1 unit

It is divided into 3 equal parts.

TR = RS = SU = $\frac{1}{3}$

R = $-1-\frac{1}{3}=-\frac{3}{3}-\frac{1}{3}=\frac{-4}{3}$

S = $-1-\frac{2}{3}=-\frac{3}{3}-\frac{2}{3}=-\frac{5}{3}$

Similarly,

AB = 1 unit

It is divided into 3 equal parts.

P = $2+\frac{1}{3}=\frac{6}{3}+\frac{1}{3}=\frac{7}{3}$

Q = $2+\frac{2}{3}=\frac{6}{3}+\frac{2}{3}=\frac{8}{3}$

Q6 :

Which of the following pairs represent the same rational number?

(i) $\frac{-7}{21}$ and $\frac{3}{9}$ (ii) $\frac{-16}{20}$ and $\frac{20}{-25}$ (iii) $\frac{-2}{-3}$ and $\frac{2}{3}$

(iv) $\frac{-3}{5}$ and $\frac{-12}{20}$ (v) $\frac{8}{-5}$ and $\frac{-24}{15}$ (vi) $\frac{1}{3}$ and $\frac{-1}{9}$

(vii) $\frac{-5}{-9}$ and $\frac{5}{-9}$

Answer :

(i) $\frac{-7}{21}$ and $\frac{3}{9}$, therefore, it does not represent same rational numbers.

$\frac{-7}{21}=\frac{-1}{3}$

$\frac{3}{9}=\frac{1}{3}$

As $\frac{-1}{3}\neq\frac{1}{3}$

(ii) $\frac{-16}{20}$ and $\frac{20}{-25}$ Therefore, it represents same rational numbers.

$\frac{-16}{20}=\frac{-4}{5}$

$\frac{-20}{25}=\frac{-4}{5}$ Therefore, it represents same rational numbers.

(iii) $\frac{-2}{-3}$ and $\frac{2}{3}$

$\frac{-2}{-3}=\frac{2}{3}$ Therefore, it represents same rational numbers.

(iv) $\frac{-3}{5}$ and $\frac{-12}{20}$

$\frac{-12}{20}=\frac{-3}{5}$

Therefore, it represents same rational numbers.

(v) $\frac{8}{-5}$ and $\frac{-24}{15}$

$\frac{-24}{15}=\frac{-8}{5}$

$\frac{8}{-5}=\frac{-8}{5}$

, therefore, it does not represent same rational numbers.

(vii) $\frac{-5}{-9}$ and $\frac{5}{-9}$

(vi) $\frac{1}{3}$ and $\frac{-1}{9}$

$\frac{-5}{-9}=\frac{5}{9}$

As $\frac{1}{3}\neq\frac{-1}{9}$

As $\frac{5}{9}\neq\frac{-5}{9}$, therefore, it does not represent same rational numbers.

Q7 :

Rewrite the following rational numbers in the simplest form:

(i) $\frac{-8}{6}$ (ii) $\frac{25}{45}$

(iii) $\frac{-44}{72}$ (iv) $\frac{-8}{10}$

Answer :

(i) $\frac{-8}{6}=\frac{-4\times 2}{3\times 2}=\frac{-4}{3}$

(ii) $\frac{25}{45}=\frac{5\times 5}{9\times 5}=\frac{5}{9}$

(iii) $\frac{-44}{72}=\frac{-11\times 4}{18\times 4}=\frac{-11}{18}$

(iv) $\frac{-8}{10}=\frac{-4\times 2}{5\times 2}=\frac{-4}{5}$

Q8 :

Fill in the boxes with the correct symbol out of >, <, and =

(i) $\frac{-5}{7}\square\frac{2}{3}$ (ii) $\frac{-4}{5}\square\frac{-5}{7}$ (iii) $\frac{-7}{8}\square\frac{14}{-16}$

(iv) $\frac{-8}{5}\square\frac{-7}{4}$ (v) $\frac{1}{-3}\square\frac{-1}{4}$ (vi) $\frac{5}{-11}\square\frac{-5}{11}$

(vii) $0\square\frac{-7}{6}$

Answer :

$$\frac{-5}{7}=\frac{-5\times3}{7\times3}=\frac{-15}{21}$$
$$\frac{2}{3}=\frac{2\times7}{3\times7}=\frac{14}{21}$$

As - 15 < 14,

Therefore, $\frac{-5}{7}\square\frac{2}{3}$

(ii)

$$\frac{-4}{5}=\frac{-4\times7}{5\times7}=\frac{-28}{35}$$
$$\frac{-5}{7}=\frac{-5\times5}{7\times5}=\frac{-25}{35}$$

As - 28 < - 25

Therefore, $\frac{-4}{5}\square\frac{-5}{7}$

(iii) Here, $\frac{14}{-16}=\frac{7\times2}{-8\times2}=\frac{7}{-8}=\frac{-7}{8}$

Therefore, $\frac{-7}{8}\square\frac{14}{-16}$

(iv)

$$\frac{-8}{5}=\frac{-8\times4}{5\times4}=\frac{-32}{20}$$
$$\frac{-7}{4}=\frac{-7\times5}{4\times5}=\frac{-35}{20}$$

As - 32 > - 35,

Therefore, $\frac{-8}{5}\square\frac{-7}{4}$

(v)

$$\frac{-1}{3}=\frac{-1\times4}{3\times4}=\frac{-4}{12}$$
$$\frac{-1}{4}=\frac{-1\times3}{4\times3}=\frac{-3}{12}$$

As - 4 < - 3,

Therefore, $\frac{-1}{3}\square\frac{-1}{4}$

(i)

(vi) $\frac{5}{-11} \square \frac{-5}{11}$

(vii) $0 \square \frac{-7}{6}$

Q9 :

Which is greater in each of the following?

(i) $\frac{2}{3}, \frac{5}{2}$ **(ii)** $\frac{-5}{6}, \frac{-4}{3}$ **(iii)** $\frac{-3}{4}, \frac{2}{-3}$

(iv) $\frac{-1}{4}, \frac{1}{4}$ **(v)** $-3\frac{2}{7}, -3\frac{4}{5}$

Answer :

(i) $\frac{2}{3}, \frac{5}{2}$

By converting these into like fractions,

$$\frac{2}{3} = \frac{2\times 2}{3\times 2} = \frac{4}{6}$$

$$\frac{5}{2} = \frac{5\times 3}{2\times 3} = \frac{15}{6}$$

As 15 > 4, therefore, $\frac{5}{2}$ is greater.

(ii) $\frac{-5}{6}, \frac{-4}{3}$

$$\frac{-4}{3} = \frac{-4\times 2}{3\times 2} = \frac{-8}{6}$$

$$\text{As } -5 > -8, \text{ therefore, } \frac{-5}{6} \text{ is greater.}$$

(iii)

$$\frac{-3}{4}, \frac{2}{-3}$$

$$\text{Or, } \frac{-3}{4}, \frac{-2}{3}$$

By converting these into like fractions,

$$\frac{-3}{4}=\frac{-3\times3}{4\times3}=\frac{-9}{12}$$

$$\frac{-2}{3}=\frac{-2\times4}{3\times4}=\frac{-8}{12}$$

$$\text{As}-8>-9,\ \text{therefore},\frac{-2}{3}\text{is greater.}$$

(iv) $\frac{-1}{4},\ \frac{1}{4}$

$$\frac{1}{4}>\frac{-1}{4}$$

(v) $-3\frac{2}{7},\ -3\frac{4}{5}$

$$\frac{-23}{7},\ \frac{-19}{5}$$

By converting these into like fractions,

$$\frac{-23}{7}=\frac{-23\times5}{7\times5}=\frac{-115}{35}$$

$$\frac{-19}{5}=\frac{-19\times7}{5\times7}=\frac{-133}{35}$$

$$\text{As}-115>-133,\ \text{therefore},-3\frac{2}{7}\text{is greater.}$$

Q10 :
Write the following rational numbers in ascending order:

(i) $\frac{-3}{5},\frac{-2}{5},\frac{-1}{5}$ (ii) $\frac{-1}{3},\frac{-2}{9},\frac{-4}{3}$ (iii) $\frac{-3}{7},\frac{-3}{2},\frac{-3}{4}$

Answer :

(i) $\frac{-3}{5},\ \frac{-2}{5},\ \frac{-1}{5}$

As - 3 < - 2 < - 1,

$$\therefore\frac{-3}{5}<\frac{-2}{5}<\frac{-1}{5}$$

(ii) $\frac{-1}{3},\ \frac{-2}{9},\ \frac{-4}{3}$

By converting these into like fractions,

$$\frac{-1\times3}{3\times3},\frac{-2}{9},\frac{-4\times3}{3\times3}$$

$$\frac{-3}{9},\frac{-2}{9},\frac{-12}{9}$$

As - 12 < - 3 < - 2,

$$\therefore \frac{-4}{3}<\frac{-1}{3}<\frac{-2}{9}$$

(iii) $\frac{-3}{7},\frac{-3}{2},\frac{-3}{4}$

By converting these into like fractions,

$$\frac{-3\times4}{7\times4},\frac{-3\times14}{2\times14},\frac{-3\times7}{4\times7}$$

$$\frac{-12}{28},\frac{-42}{28},\frac{-21}{28}$$

As - 42 < - 21 < - 12,

$$\therefore \frac{-3}{2}<\frac{-3}{4}<\frac{-3}{7}$$

Exercise 9.2 : Solutions of Questions on Page Number: **190**

Q1 :

Find the sum:

(i) $\frac{4}{5}+\left(\frac{-11}{4}\right)$ (ii) $\frac{5}{3}+\frac{3}{5}$ (iii) $\frac{-9}{10}+\frac{22}{15}$

(iv) $\frac{-3}{-11}+\frac{5}{9}$ (v) $\frac{-8}{19}+\frac{(-2)}{57}$ (vi) $\frac{-2}{3}+0$

(vii) $-2\frac{1}{3}+4\frac{3}{5}$

Answer :

(i)45+(- 11 4) = 45 - 11 4 = 16 - 5520 = - 39 20

(ii) $\frac{5}{3}+\frac{3}{5}$

L.C.M of 3 and 5 is 15.

$$\frac{5}{3}+\frac{3}{5}=\frac{5\times5}{3\times5}+\frac{3\times3}{5\times3}=\frac{25}{15}+\frac{9}{15}=\frac{25+9}{15}=\frac{34}{15}$$

(iii) $\frac{-9}{10}+\frac{22}{15}$

L.C.M of 10 and 15 is 30.

$$\frac{-9}{10}+\frac{22}{15}=\frac{-9\times3}{10\times3}+\frac{22\times2}{15\times2}=\frac{-27}{30}+\frac{44}{30}=\frac{-27+44}{30}=\frac{17}{30}$$

(iv) $\left|\frac{-3}{-11}+\frac{5}{9}\right|=\frac{3}{11}+\frac{5}{9}$

L.C.M of 11 and 9 is 99.

$$\frac{3}{11}+\frac{5}{9}=\frac{3\times9}{11\times9}+\frac{5\times11}{9\times11}=\frac{27}{99}+\frac{55}{99}=\frac{27+55}{99}=\frac{82}{99}$$

(v) $\frac{-8}{19}+\frac{(-2)}{57}=-\frac{8}{19}-\frac{2}{57}$

L.C.M of 19 and 57 is 57.

$$-\frac{8}{19}-\frac{2}{57}=-\frac{8\times3}{19\times3}-\frac{2}{57}=-\frac{24}{57}-\frac{2}{57}=\frac{-24-2}{57}=\frac{-26}{57}$$

(vi) $\left|\frac{-2}{3}+0\right|=\frac{-2}{3}$

(vii) $-2\frac{1}{3}+4\frac{3}{5}=\left|\frac{-7}{3}+\frac{23}{5}\right|$

L.C.M of 3 and 5 is 15.

$$\frac{-7}{3}+\frac{23}{5}=\frac{-7\times5}{3\times5}+\frac{23\times3}{5\times3}=\frac{-35}{15}+\frac{69}{15}=\frac{-35+69}{15}=\frac{34}{15}$$

Q2 :

Find

(i) $\frac{7}{24}-\frac{17}{36}$ (ii) $\frac{5}{63}-\left(\frac{-6}{21}\right)$ (iii) $\frac{-6}{13}-\left(\frac{-7}{15}\right)$

(iv) $\frac{-3}{8}-\frac{7}{11}$ (v) $-2\frac{1}{9}-6$

Answer :

(i) $\frac{7}{24}-\frac{17}{36}$

L.C.M of 24 and 36 is 72.

$$\frac{7}{24}-\frac{17}{36}=\frac{7\times3}{24\times3}-\frac{17\times2}{36\times2}=\frac{21}{72}-\frac{34}{72}=\frac{21-34}{72}=\frac{-13}{72}$$

(ii) $\frac{5}{63}-\left(\frac{-6}{21}\right)=\frac{5}{63}+\frac{2}{7}$

L.C.M of 63 and 7 is 63.

$$\frac{5}{63}+\frac{2}{7}=\frac{5}{63}+\frac{2\times9}{7\times9}=\frac{5}{63}+\frac{18}{63}=\frac{5+18}{63}=\frac{23}{63}$$

(iii) $\frac{-6}{13}-\left(\frac{-7}{15}\right)=\frac{-6}{13}+\frac{7}{15}$

L.C.M of 13 and 15 is 195.

$$\frac{-6}{13}+\frac{7}{15}=\frac{-6\times15}{13\times15}+\frac{7\times13}{15\times13}=\frac{-90}{195}+\frac{91}{195}=\frac{-90+91}{195}=\frac{1}{195}$$

(iv) $\frac{-3}{8}-\frac{7}{11}$

L.C.M of 8 and 11 is 88.

$$\frac{-3}{8}-\frac{7}{11}=-\frac{3\times11}{8\times11}-\frac{7\times8}{11\times8}=-\frac{33}{88}-\frac{56}{88}=\frac{-33-56}{88}=\frac{-89}{88}$$

(v) $-2\frac{1}{9}-6=-\frac{19}{9}-\frac{6}{1}$

L.C.M of 9 and 1 is 9.

$$-\frac{19}{9}-\frac{6}{1}=-\frac{19}{9}-\frac{6\times9}{1\times9}=-\frac{19}{9}-\frac{54}{9}=\frac{-19-54}{9}=\frac{-73}{9}$$

Q3 :

Find the product:

(i) $\frac{9}{2}\times\left(\frac{-7}{4}\right)$ (ii) $\frac{3}{10}\times(-9)$ (iii) $\frac{-6}{5}\times\frac{9}{11}$

(iv) $\frac{3}{7}\times\left(\frac{-2}{5}\right)$ (v) $\frac{3}{11}\times\frac{2}{5}$ (vi) $\frac{3}{-5}\times\frac{-5}{3}$

Answer :

(i) $\frac{9}{2}\times\left(\frac{-7}{4}\right)=\frac{9\times(-7)}{2\times4}=\frac{-63}{8}$

(ii) $\frac{3}{10}\times(-9)=\frac{3}{10}\times\frac{(-9)}{1}=\frac{3\times(-9)}{10\times1}=\frac{-27}{10}$

(iii) $\frac{-6}{5}\times\frac{9}{11}=\frac{-6\times9}{5\times11}=\frac{-54}{55}$

(iv) $\frac{3}{7}\times\left(\frac{-2}{5}\right)=\frac{3\times(-2)}{7\times5}=\frac{-6}{35}$

(v) $\frac{3}{11}\times\frac{2}{5}=\frac{3\times2}{11\times5}=\frac{6}{55}$

(vi) $\frac{3}{-5}\times\frac{-5}{3}=\frac{3\times(-5)}{(-5)\times3}=\frac{-15}{-15}=1$

Q4 :

Find the value of:

(i) $(-4)\div\frac{2}{3}$ (ii) $\frac{-3}{5}\div2$ (iii) $\frac{-4}{5}\div(-3)$

(iv) $\frac{-1}{8}\div\frac{3}{4}$ (v) $\frac{-2}{13}\div\frac{1}{7}$ (vi) $\frac{-7}{12}\div\left(\frac{-2}{13}\right)$

(vii) $\frac{3}{13}\div\left(\frac{-4}{65}\right)$

Answer :

(i) $-4 \div \frac{2}{3} = -4 \times \frac{3}{2} = \frac{-12}{2} = -6$

(ii) $\frac{-3}{5} \div 2 = \frac{-3}{5} \times \frac{1}{2} = \frac{-3 \times 1}{5 \times 2} = \frac{-3}{10}$

(iii) $\frac{-4}{5} \div (-3) = \frac{-4}{5} \times \frac{1}{-3} = \frac{(-4) \times 1}{5 \times (-3)} = \frac{-4}{-15} = \frac{4}{15}$

(iv) $\frac{-1}{8} \div \frac{3}{4} = \frac{-1}{8} \times \frac{4}{3} = \frac{-1 \times 4}{8 \times 3} = \frac{-4}{24} = -\frac{1}{6}$

(v) $\frac{-2}{13} \div \frac{1}{7} = \frac{-2}{13} \times 7 = \frac{-14}{13}$

(vi) $\frac{-7}{12} \div \left(\frac{-2}{13}\right) = \frac{-7}{12} \times \frac{13}{-2} = \frac{(-7) \times 13}{12 \times (-2)} = \frac{-91}{-24} = \frac{91}{24}$

(vii) $\frac{3}{13} \div \left(\frac{-4}{65}\right) = \frac{3}{13} \times \frac{65}{-4} = \frac{3 \times 65}{13 \times (-4)} = \frac{195}{-52} = -\frac{15}{4}$