LINES AND ANGLE - CHAPTER 7

EXERCISE 7A

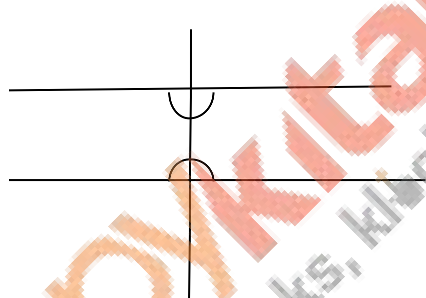
ANSWER1

(i) **Angle**

In mathematics, particularly geometry, angles are formed by two rays (or lines) that begin at the same point or share the same endpoint. The angle measures the amount of turn between the two arms or sides of an angle and is usually measured in degrees or radiANSWER.

(ii) **Interior of an angle**

an angle formed between parallel lines by a third line that intersects them. an angle formed within a polygon by two adjacent sides.

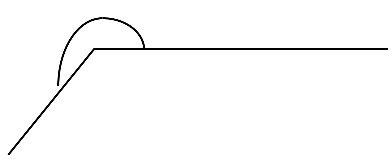


(iii) **Obtuse angle**

An obtuse angle is more than 90° but less than 180° In other words, it is between a right angle and a straight angle.

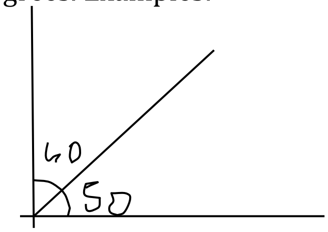
(iv) **Reflex angle**

The reflex angle is the larger angle. It is more than 180° but less than 360° If you choose the smaller angle you might have an Acute Angle, or an Obtuse Angle instead: The larger angle is a Reflex Angle, but the smaller angle is an Acute Angle.



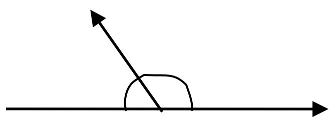
(v) **Complementary angle**

Two Angles are Complementary when they add up to 90 degrees (a Right Angle). They don't have to be next to each other, just so long as the total is 90 degrees. Examples: • 60° and 30° are complementary angles



(vi) **Supplementary angle**

Two Angles are Supplementary when they add up to 180 degrees. They don't have to be next to each other, just so long as the total is 180 degrees. Examples: • 60° and 120° are supplementary angles.



ANSWER2

(i) 55°

Let the measure of the required angle be x°

Then, measure of its complement = (90-x)°

So, 90-55° = 35°

(ii) 16°

Then, measure of its complement = (90-x)°

So, 90-16° = 74°

(iii) 90°

Then, measure of its complement = (90-x)°

So, 90-90° = 0°

(iv) 2/3 of right angel

It corresponds to 60°

Then, measure of its complement = (90-x)°

So, 90-60° = 30°

ANSWER3

(i) 42°

Then, measure of its complement = (180-x)°

So, 180-42° = 138°

(ii) 90°

Then, measure of its complement = (180-x)°

So, 180°-90° = 90°

(iii) 124°

Then, measure of its complement = (180-x)°

So, 180-124° = 56°

(iv) 3/5 of right angle

And it corresponds to 56°

Then, measure of its complement = (180-x)°

So, 180°-56° = 126°

ANSWER4

(i) Two angles are said to be complementary , if the sum of their measure is 90°.

So, half of it 45°

(ii) Two angles are said to be supplementary , if the sum of their measure is 180°.

So, half of it 90°

ANSWER5

Let the measure of the required angle be x°

Then, measure of its complement = (90-x)°

So,

$$x = (90 - x) + 36$$

$$2x = 90 + 36$$

$$x = \frac{126}{2} = 63$$

Hence , 63°

ANSWER6

Let the measure of the required angle be x°

Then, measure of its supplement = (180-x)°

So,

$$x = (180 - x) - 30$$
$$2x = 180 - 30$$
$$2x = 150$$
$$x = \frac{150}{2} = 75$$

Hence, 75°

ANSWER7

Let the angle be x° to measure its complement.
Acc to question.

$$x = 4(90 - x)$$
$$x + 4x = 360$$
$$5x = 360$$
$$x = 72$$

Hence, 72°

ANSWER8

Let the angle be x° to measure its supplement
Acc to question,

$$x = 5(180 - x)$$
$$x + 5x = 900$$
$$6x = 900$$
$$x = 150$$

Hence, 150°

ANSWER9

Let the angle be x°
Acc to question,

$$(180 - x) = 4(90 - x)$$
$$180 - x = 360 - 4x$$
$$4x - x = 360 - 180$$
$$3x = 180$$
$$x = 60$$

Hence, 60°

ANSWER10
Let the angle be x°
Acc to question,

$$(90-x)=\frac{1}{3}(180-x)$$
$$270-3x=180-x$$
$$270-180=3x-x$$
$$90=2x$$
$$x=45$$

Hence, 45°

ANSWER11
Let the angle be x°
Acc to question,

$$4x+5x=90$$
$$9x=90$$
$$x=10$$

Hence angle be 4x = 4 X 10= 40°
Another angle be 5x = 5 X 10 = 50°

ANSWER12
Let the angle be x°

Acc to question,

$$(2x-5)+(x-10)=90$$
$$3x-15=90$$
$$3x=90+15$$
$$3x=105$$
$$x=35$$

EXERCISE7B

ANSWER1
Acc to question ,
AOB is straight line so ,

$$180-62=118$$

X=118

ANSWER2
The value of x can be calculated by ,

$$180=(3x-7)+55+(x+20)$$
$$180=4x+68$$
$$4x=180-68$$
$$4x=112$$
$$x=\frac{112}{4}=28$$

hence, the $\angle AOC$ = 3x-7 = 3 X 28-7= 77°
∠BOD = x+20 = 28+20 =48°

ANSWER3
The value of X can be calculated by,

$$180=(3x+7)+(2x-19)+x$$
$$180=6x-12$$
$$6x=180+12$$
$$x=\frac{192}{6}=32$$

Hence, the ∠AOC= 3X+7=3 X 32+7= 103°
the ∠COD = 2x-19 = 2 X 32-19 = 45°
∠BOD= 32°

Answer4
Given x:y:z = 5:4:6
Let be x=5t°
Y=4t°
Z= 6t°

$$x + y + z = 180$$
$$5t + 4t + 6t = 180$$
$$15t = 180$$
$$t = \frac{180}{15} = 12$$

Hence, x=5 X 12=60
y = 4 X 12=48
z = 6 X 12= 72

Answer5
let value of x be

$$180 = (3x + 20) + (4x - 36)$$
$$180 = 7x - 16$$
$$7x = 180 + 16$$
$$7x = 196$$
$$x = \frac{196}{7} = 28$$

Answer6
Given, ∠AOC= 50°
Acc to vertical opposite angle , ∠BOD = 50°

AB is straight line so,

$$180 - 50 = 130$$

Hence, ∠BOC=130°
And ∠AOD = 130°

Answer7
Let on line AB we get value of x

$$180 = x + 50 + 90$$
$$180 = x + 140$$
$$x = 180 - 140$$
$$x = 40$$

Now, let on the line CD we get value of t,

$$180 = t + x + 50$$
$$180 = t + 40 + 50$$
$$180 = t + 90$$
$$t = 90$$

Now, on line EF we get the value of z

$$180 = z + t + x$$
$$180 = z + 90 + 40$$
$$180 = z + 130$$
$$z = 50$$

So, the value of Y will be acc to vertically opposite y=40

Answer8

Acc to vertically opposite angles

∠COE = ∠DOF = 5x

So,

$$180 = 3x + 5x + 2x$$
$$180 = 10x$$
$$x = 18$$

So, ∠ AOD = 2x=2 X 18=36°

∠COE = 5x = 5 X 18=90°

∠AOE=3x = 3 X 18 =54°

Answer9

Let the angle be x°

$$180 = 5x + 4x$$
$$180 = 9x$$
$$x = 20$$

Hence , the measuring angle be 5x=100° and 4x= 4 X 20=80°

Answer 10

Given , if 2 straight lines intersect each other in a such a way that one of the angles formed measures 90°

Acc to right angle, others angles be also 90° because intersect at right angle given equal angles.

Answer11
Given , ∠ BOC + ∠AOD = 280
Vertically opposite
∠BOC=∠AOD= 280/2=140°
So, ∠BOD = ∠AOC (vertically opposite)

$$180 = 140 + AOC$$
$$AOC = 40$$

∠AOC=40° ∠BOD=40° ∠AOD=140° ∠BOC=140°

Answer12
Given ∠ AOC : ∠AOD = 5:7
Let AOC= 5x and AOD = 7x

AOC+AOD=180

$$5x + 7x = 180$$
$$12x = 180$$
$$x = 15$$

So, ∠AOC =5x = 5 X 15= 75°
∠ AOD = 7x= 7 X 15 = 105°

As,
∠AOC= ∠BOD=75° [vertically opposite angles]
∠AOD= ∠BOC=105° [vertically opposite angles]

∠AOD=105° ∠AOC=75° ∠BOC=105° ∠BOD=75°

Answer13.
Given, ∠AOE=35° and ∠BOD=40°

∠BOD = ∠AOC = 40° [vertically opposite angles]
∠AOE = ∠FOB = 35°[vertically opposite angles]

Sum of all angles on formed on upper side of AOB at point O is 180°
So, ∠AOE + ∠EOD + ∠BOD = 180°
35° + ∠COF + 40° = 180°
∴ ∠EOD = 180° – 75° = 105°

∠EOD = ∠COF = 105° [vertically opposite angles]

Answer14.
Given ∠BOC = 125°
∠BOC = y°= 125° [vertically opposite angles]

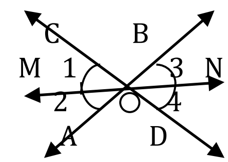
Sum of all angles on line DOC is 180°

∠DOB (z°) + ∠BOC = 180

z°= 180 – 125 = 55°

z ° = x° = 55° [vertically opposite angles]

Answer 15



Let the ray OM bisects ∠AOC and ray ON be opposite to OM

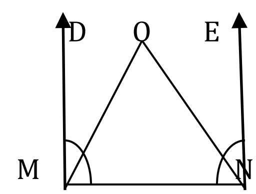
Then, MON is a straight line

So, ∠1 =∠4 [vertically opposite angles]

∠3 = ∠2[vertically opposite angles]

∠1= ∠2 ⇒ ∠3 = ∠4 [Adjacent angles]

Answer16.



Given, ∠ DMN + ENM = 180°. OA and OB are bisectors of ∠ DMN ∠ ENM respectively.

∴ ∠ DMO + ∠ OMN = 1/2 (∠ DMN).....(1)

⇒ ∠ ENO+ ∠ ONM = 1/2 (∠ ENM)....(2)

⇒ ∠ DMN + ∠ ENM = 180°

⇒ 2 (∠ OMN) + 2 (∠ ONM) = 180° [using (1) and (2)]

⇒ ∠ OMN + ∠ ONM = 90°

In Δ MNO,

∠ OMN + ∠ ONM + ∠ MN0 = 180° (Angle Sum property)

⇒ 90° + ∠ MNO = 180°

⇒ ∠ MNO = 180° - 90°

⇒ ∠ MNO = 90°

So, the bisectors of the two adjacent supplementary angles include a right angle.

Hence proved.

EXERCISE 7C

Answer1.
Given $\angle 1 = 120°$ an l||m
$\angle 2 = 180° - \angle 1$ [Supplymentry angles]
$\angle 2 = 60°$

$\angle 3 = \angle 1$ [Vertically opposite angles]
$\angle 3 = 120°$

$\angle 2 = \angle 4$ [vertically opposite angles]
$\angle 4 = 60°$

$\angle 1 = \angle 5 = 120°$ [corresponding angles]

$\angle 5 = \angle 7 = 120°$ [vertically opposite angles]

$\angle 4 = \angle 8 = 60°$ [corresponding angles]

$\angle 6 = \angle 8 = 60°$ [vertically opposite angles]

Answer2.
Given, $\angle 7 = 80°$ and l||m
$\angle 7 = \angle 5 = 80°$ [vertically opposite angles]

$\angle 8 = 180° - 80°$ [supplymentry angles]
$= 100°$

$\angle 8 = \angle 4 = 100°$ [corresponding angles]

$\angle 4 = \angle 2 = 100°$[vertically opposite angles]

$\angle 7 = \angle 3 = 80°$ [corresponding angles]

$\angle 3 = \angle 1 = 80°$ [vertically opposite angles]

$\angle 8 = \angle 6 = 100°$[vertically opposite angles]

Answer3.
Given => $\angle 1 : \angle 2 = 2:3$ and l||m
$\angle 1 + \angle 2 = 180°$ [supplymentry angles]
So, $2x + 3x = 180°$
$5x = 180°$

$\angle 1 = 2x = 72°$
$\angle 2 = 108°$

$\angle 2 = \angle 6 = 108°$ [corresponding angles]

$\angle 2 = \angle 4 = 108°$ [vertically opposite angles]

$\angle 5 = \angle 1 = 72°$ [corresponding angles]

$\angle 3 = \angle 1 = 72°$ [vertically opposite angles]

$\angle 7 = \angle 5 = 72°$ [vertically opoosite angles]

$\angle 6 = \angle 8 = 108°$ [vertically opposite angles]

Answer4.
Given lines l and m are || to each other
$\angle(3x - 20) = \angle(2x + 10)$ [corresponding angles]
$3x - 2x = 10 + 30$
$x = 30$

Answer5.
Given lines l and m are || are to each other,
$\angle(3x + 5) + \angle 4x = 180°$ [consecutive interior angles]
$7x = 180° - 5°$
$x = 25°$

Answer6.
Given AB∥CD and BC∥ ED is parallel line
Then, $180 = x - 75°$
$X = 180 - 75 = 105°$

Answer7
Given AB∥CD∥EF, ∠ABC=70° and ∠CEF=130° and EC is traversal .

So, $\angle CEF + \angle ECD = 180°$
$\angle ECD + 130 = 180°$
$\angle ECD = 180 - 130 = 50°$

So, $\angle ABC = \angle DCB$ [alternative angles]
$70 = x + 50$
$X = 70 - 50 = 20$

Answer8
Given , AB∥CD, ∠AEF = 75° and ∠EGD=125°
$\angle AEF = \angle EFG = 75°$ [alternative angle]
$y = 75°$

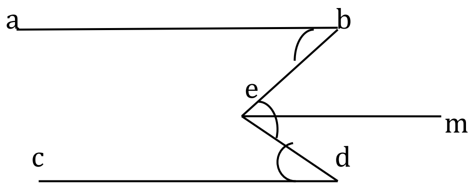
So, , CFGD is straight line.
Then , $\angle CFE+\angle EFG=180$
$\angle CFE= 180- \angle EFG = 180-75°$
$\angle CFE=105°$
$x=105°$

so, $\angle AEG = \angle EGD$ [alternative angles]
then , $125 = z+75$
$z= 125-75 = 50°$

Answer9

(i)

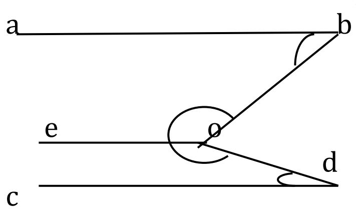
Given , AB∥CD , Draw line parallel to AB∥CD and intersect ∠EBD in between



∴ $\angle ABE = \angle BEM = 35°$ [alternative angles]
$\angle MED=\angle CDE = 65°$

$x° = \angle BEM + \angle MED$
$x°= 35+65 = 100°$

(ii) Given , AB∥CD , Draw line parallel to AB∥CD and intersect ∠BOD in between
$\angle ABO = 55°$ and $\angle ODC = 25°$



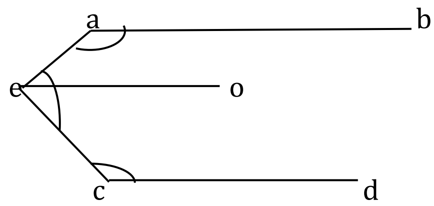
∴ $\angle ABO +\angle EOB = 180°$
$55 + \angle EOB = 180$
$\angle EOB = 180-55 = 125°$

CD∥EO and DO is trAnswerversal
∴ $\angle EOD+\angle CDO = 180$
$\angle EOD= 180-25 = 155°$

Hence, ∠BOD = ∠EOD +∠EOB

= 125+155 = 280°

(iii) Given , AB∥CD , Draw line parallel to AB∥CD and intersect ∠AEC in between



Given ∠BAE = 116° and ∠ECD=124°

AB∥EO and AE is trAnswerversal

∠BAE +∠AEO = 180°

∠AEO = 180- ∠BAE = 180-116 = 64°

And EO∥CD and EC is trAnswerversal

∠OEC+∠ECD=180°

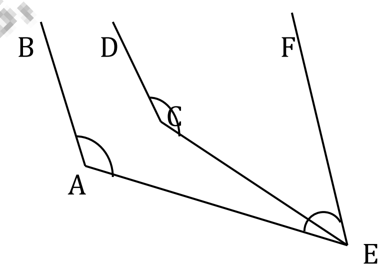
∠OEC = 180- ∠ECD = 180 – 124 = 56

∴ x° = ∠AEO +∠OEC

= 64° + 56°

= 120

Answer10



Draw AB∥CD∥EF

Given , ∠BAE = X° (find)

∠AEC=20° and ∠DCE=130°

∴ CD∥EF and CE is trAnswerversal

∠DCE + ∠CEF = 180

∠CEF = 180-130 = 50°

∴ AB∥EF and ∠AEF = 20+50 =70°

∠BAE + ∠AEF = 180

X + 70 = 180

X= 180-70=110°

Answer11

Given , AB∥PQ and EF intersect parallel lines

So, on straight lines EF

75°+20°+∠GEF = 180

∠GEF= 180-75-20 = 85°

Sum of all angel of a triangle be 180

X+25+85 = 180

X = 180-85-25 = 70°

And 25°+y°= 75° [corresponding angles]

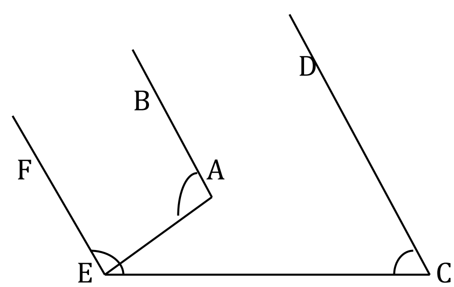
y° = 75-25 =50°

Answer12
Given, AB∥CD and AC is trAnswerversal
∠BAC +∠ACD = 180°
∠ACD= 180-75 = 105°
∴ ∠ACD = ∠ECF = 105°
So, sum of all the angle of a triangle
X + 30+ 105 = 180
X= 180 -105-30 = 180-135 =45°

Answer13
AB∥CD , ∠PEF=85° and ∠QHG=115°
So, ∠QGH = ∠GEF [corresponding angle]
PQ is straight line
Then ∠PEF +∠GEF = 180
∠GEF = 180-85 = 95°
∴ DC is straight line
So, ∠GHQ + ∠QHC = 180°
∠GHQ = 180 - ∠QHC = 180 – 115 = 65°
sum of all the angle of a triangle
X°+65 +95 = 180
X°= 180-95-65 = 20°

ANSWER14
Acc to alternative angles ,
X ° = ∠ABC = ∠DCB
x° = 35°
and z° = ∠ADC = ∠BAD
Z° = 75°
So, sum of all angle of a triangle
x°+y°+z°= 180
35 +y +75 = 180
y°= 180 -75-35 = 70°

Answer15
draw FE∥AB∥CD,



EF ∥CD and EC is trAnswerversal
Then, ∠FEC +∠DCE = 180

AE∥EF and EA is trAnswerversal
Then , ∠FEA +∠EAB = 180
So, ∠FEA +∠EAB = ∠FEC +∠DCE
⇒ ∠EAB - ∠DCE = (∠FEC - ∠FEA) =∠AEC
Hence proved

Answer16

AB∥CD

Draw parallel line LF∥AB∥CD and intersect ∠EFG in equal part

So, CD is straight line ∠FGD = r°

∠CGF + ∠FGD = 180……(I)

∠CGF = 180 -r°

Then,

∠AEF +∠LFE = 180…….(II)

So, ∠EFG = ∠LFE + ∠LFG = q°

Adding 2 eq.

180+180 = (p°+∠LFE) +(180-r° + ∠LFG)

°180 = p° + (∠LFE +∠LFG) - r°

180° = p°+q°-r°

Hence proved

Answer17

Given AB∥CD and EF∥GH

By the fig, x°= 60 [vertical opposite angle]

And y° = 60 [alternative angle]

AB is straight line

Then, ∠APR +∠QPR = 180

110 + ∠QPR = 180

∠QPR = 180-110

= 70°

So, ∠QPR = ∠BQS = 70° [corresponding angle]

z°= 70°

so, ∠BQS =∠RSQ [alternative angle]

z°=t°=70°

Answer18

acc to supplementary theorem,

∠BEF +∠CFE = 180

∴ ½ ∠BEF + ½ ∠CFE = 180

So, ∠FEG +∠GFE = 90°

Now, in ∆EFG

∠FEG+∠GFE+∠FGE=180

90 + ∠FGE = 180

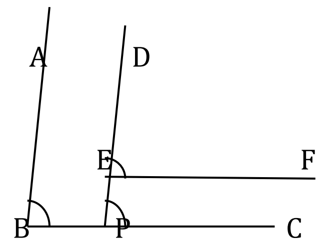
∠FGE = 180-90 = 90°

Answer19

Given AB∥CD and t is the trAnswerversal

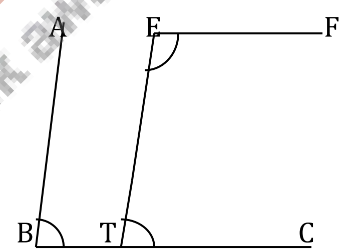
Acc to fig,

∠AEF = ∠EFD [alternative angle]
½ ∠AEF = ½ ∠EFD
∠FEP =∠EFQ
But these are alternative interior angle
Hence, EP∥FQ



Answer20
Given, BA∥ED and BC∥EF
Draw a such line DE which extend to P on BC
BA∥DP and BPC is trAnswerversal
∴ ∠ABC = ∠DPC [corresponding angle]
EF∥BC and DP is trAnswerversal
∴∠DEF =∠DPC [corresponding angle]
Hence, ∠ABC =∠DPC

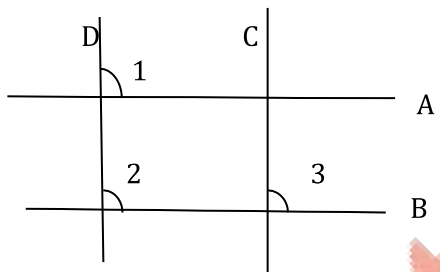
Answer21
Given AB∥PE and BTC is trAnswerversal
Draw a such line DE which extend to T on BC
∴ ∠ABT + ∠BTE = 180
⇒∠ABC +∠BTE = 180 …………….(i)
Now, EF∥BPC and EP is the trAnswerversal
∴∠BTE =∠TEF
⇒∠BTE = ∠DEF…………(ii)
Hence, ∠ABC +∠DEF = 180



Answer22
Let the normals at A and B meet at P.
Since angle of incidence = angle of relection,
∠1=∠2 and ∠3=∠4
Mirror is perpendicular to each other ,
BP∥OA and PA∥OB
Acc to fig,
BP⊥PA , ∠APB=90°
∠2+∠3 = 90
∴∠1+∠4 =∠2+∠3 = 90°
So, ∠1+∠2+∠3+∠4 = 180°
∴ ∠DBA +∠CAB = 180°
Hence, DB∥CA and AB is trAnswerversal.

Answer23
Acc to alternative angle,
$\angle BAC = \angle ACD = 110°$
Hence, AB ∥CD
And $\angle ACD + \angle CDE = 110 + 80 = 190 \neq 180°$
SO,
$\angle ACD \neq \angle CDE$
Hence, AC is not parallel to ED

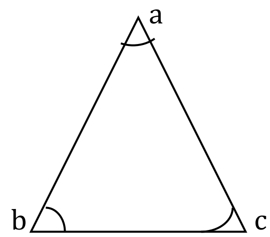
Answer24



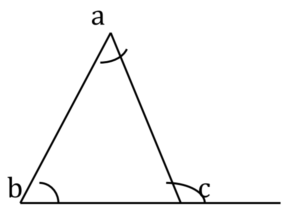
Let A∥B and D∥C
And B⊥D and A⊥C
So, $\angle 1 = 90°$ and $\angle 3 = 90°$
Then A∥B and D is trAnswerversal
$\angle 1 = \angle 2 = 90°$
Also, $\angle 3 = 90°$ (given)
∴ $\angle 2 = \angle 3 = 90°$
But these are also corresponding angles.
∴ D∥C

MULTIPLE-CHOICE QUESTIONS

Answer1(d)
Given ,
$\angle A = \angle B + \angle C$
Is the right angle triangle



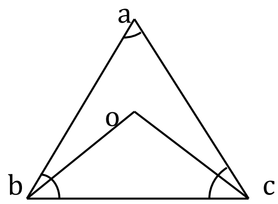
Answer2(b)



acc to question,
$\angle c = 110$
Then given $\angle a = \angle b$
$\frac{1}{2} \angle c = 55°$

Answer3(a)
Let the angle be x°
So, the angle be of a △ 3x , 5x and 7x
Sum of the angle of the triangle
3x+5x+7x =180
15x= 180
⇒X = 180/15 =12
Then , angle will be 3x= 3 X 12=36
5x =5 X 12 = 60
7x = 7 X 12= 84
Here, all the angle is less than 90° then it is acute angle

Answer4(d)



in △abc

∠a =130

then, sum of all the angle of the triangle

∠a+∠b+∠c = 180

⇒ ∠b+∠c = 180-∠a= 180-130=50

⇒∠b+∠c=50

After bisecting of other angle

½ ∠b + ½ ∠c = ½ (∠b+∠c) = ½ 50 = 25°

So, required angle= 180-25 = 155°

Answer5(b)

Given, AOB is straight line then it will be 180°

60+5x+ 3x = 180°

8x = 180-60 = 120

X= 120/8 = 15

Answer6(c)

Let angle be x°

So all the angles of △ 2x , 3x 4x

Sum of all the angle of a triangle

2x+3x+4x = 180

9x = 180

X = 180/9 = 20

So, 2x= 2 X 20=40

3x = 3 X 20=60

4x = 4 X 20= 80

Hence, largest angle of the triangle 80

Answer7 (c)

draw a EF on angle b

Given , $\angle OAB = 110°$ and $\angle DCB=130°$

$\angle eba + \angle oab = 180°$

$\angle eba = 180 - \angle oab = 180-110$

$\angle eba = 70$

So, $\angle dcb + \angle cbf = 180°$

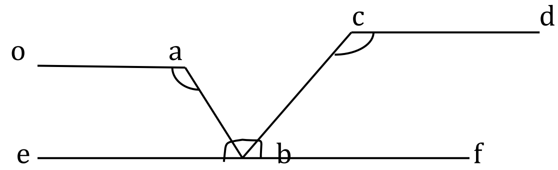
$\angle cbf = 180 - 130 = 50°$

EBF is straight line

Then , $\angle eba + \angle cbf + x° = 180$

$\Rightarrow x° = 180 - \angle eba - \angle cbf$

$x° = 180-50-70 = 60°$



Answer8(c)

there sum will be 90° thats why when 2 angle compliment each other they are right angle

Answer9(d)

An angle whose measure is more than 180° but less than 360° is called a Reflex angle

Answer10(d)

Let the angle be x°

Acc to question

$x = 5(90-x)$

$x = 450-5x$

$6x=450$

$x = 450/6 = 75°$

Answer11(b)

let the one angle be x° and another y°

so, $x°+y° = 90$..... (i)

and acc to given condition

$2x=3y$

So, $2x-3y = 0$ ......(ii)

Then , using (i)

$x = 90-y$

$2(90-y) - 3y = 0$

$-2y - 3y = -180$

$5y = 180$

$y = 180/5 = 36$

and value of $x = 90-y = 90-36 = 54$

hence , the largest angle be 54°

Answer12(c)

given AOB is a line straight line

$\angle AOC = 4x°$ $\angle BOC = 5x°$

∴$\angle AOC + \angle BOC = 180$

$4x + 5x = 180$

$9x = 180$

$x = 180/9 = 20°$

$\angle AOC = 4x = 4 \times 20 = 80°$

Answer13(b)

Given , AOB is straight line

$\angle AOC = (3x+10)$ and $\angle BOC = (4x-26)$

∴ $\angle AOC + \angle BOC = 180$

$3x + 10 + 4x - 26 = 180$

$7x - 16 = 180$

$7x = 180+16$

$7x = 196$

$x = 196/7 = 28$

hence $\angle BOC = 4x - 26 = 4 \times 28 - 26$

$= 112 - 26 = 86$

Answer14(c)

Given, AOB is straight line.

$\angle AOC = (3x-10)$

$\angle COD = 50°$

$\angle BOD = (x+20)$

So,

$\angle AOC + \angle COD + \angle BOD = 180$

$(3x-10)+50+(x+20) = 180$

$4x-60 = 180$

$\Rightarrow 4x = 180-60 = 120$

$X = 120/4 = 30$

Then, $\angle AOC = 3x-10$

$= 3 \times 30 - 10$

$= 80°$

Answer15(a)

We cannot draw a line from a single point.

Answer16(b)

Let the angle be x°

$X = 1/5(180-x)$

$5x = 180-x$

$5x + x = 180$

$6x = 180$

$X = 180/6 = 30$

Answer17(a)
AOB is straight line
Let the angle be a°
So, the angle be 4a, 5a , 6a
∴ 4a+5a+6a =180
15a =180
a = 180/15 = 12
Hence , y° = 5a = 5 X 12 = 60

Answer18(c)
Given AB and CD intersect O. ∠AOC= ϕ, ∠BOC = θ and θ=3ϕ
So, ∠AOC +∠BOC = 180
ϕ + θ = 180
ϕ +3ϕ = 180
4ϕ = 180
ϕ = 180/4 = 45

Answer19(b)
Given, straight line AB and CD intersect O. ∠AOC +∠BOD = 130°
So, ∠AOC =∠BOD …………….[vertically opp angle]
∴ ∠AOC +∠BOD = 130
2 ∠AOC = 130……………[∠AOC =∠BOD]
∠AOC= 130/2= 65
Hence,
∠AOD + ∠AOC = 180
∠AOD + 65 = 180
∠AOD = 180-65 = 115°

Answer20(c)
Here, ∠PQR = 108°
Here, angle of incidence = angle of reflection , say x°
Then , ∠AQP = ∠BQR
So, ∠AQP+ ∠PQR +∠BQR = 180
x + 108+ x = 180
2x + 108 =180
2 x = 180 – 108
x = 72/2 = 36

Answer21(C)
given, AB∥CD . ∠BAO = 60° and ∠OAB = 110°
∠BAO = ∠CEO …………..[corresponding angle]
So, ∠ECO + ∠OCD = 180
∠ECO = 180- 110
∠ECO = 70°
Hence, In △EOC

$\angle CEO + \angle AOC + \angle ECO = 180$
$60 + \angle AOC + 70 = 180$
$\angle AOC + 130 = 180$
$\angle AOC = 180 - 130$
$\angle AOC = 50°$

Answer22(a)
AB∥CD, draw parallel line OE∥AB∥CD on left side
$\angle AOC = 30°$ and $\angle OAB = 100°$
So, $\angle OAB + \angle AOE = 180$
$\angle AOE = 180 - \angle OAB = 180 - 100$
$\angle AOE = 80°$
$\therefore \angle AOE = \angle AOC + \angle COE$
$80° = 30° + \angle COE$
$\angle COE = 80 - 30 = 50°$
$\therefore \angle OCD + \angle COE = 180$
$\angle OCD = 180 - \angle COE = 180 - 50$
Hence, $\angle OCD = 130°$

Answer23(b)
Given , AB∥CD. $\angle CAB = 180°$
And $\angle EFC = 25°$
So, $\angle BAC + \angle ACD = 180$
$\angle ACD = 180 - \angle BAC$
$= 180 - 80 = 100°$
$\angle ACD = \angle CEF = 100°$ [vertical opp angle]
In $\triangle CEF$
$\angle FCE + \angle CEF + \angle CFE = 180$
$\angle CEF + 100 + 25 = 180$
$\angle CEF = 180 – 125$
$\angle CEF = 55°$

Answer24(b)
Given, AB∥CD and CD∥EF . y:z = 3:7
Let the angle be a°
So, $y = 3a°$ and $z = 7a°$
Then, on line CD as z angle is vertical opp angle
So, $y + z = 180$
$3a + 7a = 180$
$10a = 180$
$a = 180/10 = 18$
so, $y = 54$ and $z = 126$
then , $x + y = 180$
$x + 54 = 180$
$x = 180 - 54$
$x = 126$

Answer25(a)
given, AB∥CD ∠APQ = 70° ∠PRD= 120°
so, on straight line QRD
∠QRP + ∠PRD = 180
∠QRP = 180 - ∠PRD
∠QRP = 180-120 = 60°
∴ ∠QRP = ∠RPB……………[vertical opp angle]
So, on straight line APB
∠APQ +∠QPR +∠RPB = 180
70 + ∠QPR + 60 = 180
∠QPR = 180 -60-70
∠QPR = 50°

Answer26(c)
Given, AB∥CD ∠EAB=50° ∠ECD=60°
∠DCB = ∠CBA [vertical opp angle]
∠CBA = 60°
In △EBA
∠AEB +∠EAB +∠EBA = 180
∠AEB = 180 - ∠EAB - ∠EBA
= 180 – 50 -60
∠AEB = 70°

Answer27(c)
Given, ∠OAB=75° , ∠OBA= 55° , ∠OCD= 100°
In △BOA
∠OBA +∠OAB +∠BOA = 180
∠BOA + 55°+ 75° = 180
∠BOA = 180 – 130
∠BOA = 50°
∴ ∠BOA = ∠COD [vertical opp angle]
In △OCD
∠OCD +∠COD+∠ODC = 180
∠ODC = 180 - ∠OCD - ∠COD
∠ODC = 180 – 50-100
∠ODC = 30°

Answer28 (b)
By fig , On straight line AOB down side
$\angle AOE + \angle BOE = 180$
$3x + 72 = 180$
$3x = 180-72$
$X = 108/3 = 36$
So, upside of straight line AOB
$\angle AOC + \angle COD + \angle DOB = 180$
$x + 90 + y = 180$ [x=36]
$y = 180-90-36$
$y = 54°$