25. Data Handling-III Pictorial Representaion ofData as Pie Charts

DATA HANDLING - III

Pictorial Representation of Data as Pie charts or Circle Graphs

Ex:

① Given data :-

Activities	sleep	school	home	play	others	Total
No. of hours	8	7	4	2	3	24

Total no. of hours = 24 hrs.

These total no. of hours are to be represented on a 360° circle.

let the contribution of each hour on pie chart be x°.

∴ Total no. of hours = 24 hrs.

Total contribution $= 24x^\circ$

$\Rightarrow 360^\circ$

L.H.S = R.H.S.

$24x = 360^\circ$

$x = \frac{360}{24}$

$\boxed{x = 15^\circ}$

∴ Contribution of each hour spent on pie chart is 15°.

∴ for

sleeping $\Rightarrow 8x \Rightarrow 120^\circ$

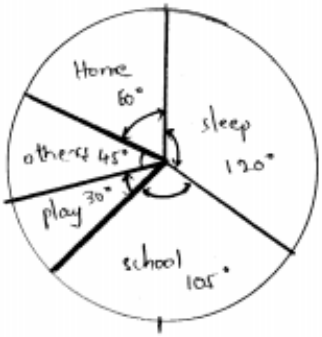
school $\Rightarrow 7x \Rightarrow 105^\circ$

home $\Rightarrow 4x \Rightarrow 60^\circ$

play $\Rightarrow 2x \Rightarrow 30^\circ$

others $\Rightarrow 3x \Rightarrow 45^\circ$

∴ The pie chart is given as



② Given data :-

Religion	Hindu	Muslim	Sikh	Christian	Total
No. of workers.	420	300	225	105	1080

Total no. of workers = 1080.

These total no. of workers are to be represented on a 360° circle.

let the contribution of each worker be x° on pie chart.

Total no. of workers = 1080.

Total angle contribution = Total. no. of workers × contribution of each worker

$\Rightarrow 1080 \times x$

$\therefore$ Total angle contribution $= 1080x$ — (1)

But total angle $= 360°$ — (2)

(1) = (2).

$1080x = 360$

$x = \frac{1}{3}°$

$\therefore$ Contribution of each worker on pie chart is $\frac{1}{3}°$.

$\therefore$ Contribution of Hindu workers $= 420 \times x$

$= 420 \times \frac{1}{3}$

Contribution of Hindu workers $= 140°$

Contribution of Muslim workers = Tot no. of workers × contribution of each worker

$\Rightarrow 300 \times \frac{1}{3}$

contribution of muslim workers $= 100°$

Similarly. Sikh workers $= 225 \times x$

$= 225 \times \frac{1}{3}$

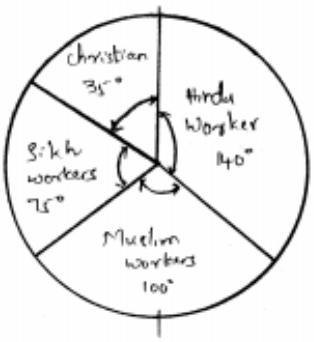
Sikh workers $= 75°$

Christian workers $= 105 \times x$

$= 105 \times \frac{1}{3}$

Christian workers $= 35°$

∴ The pie chart is given as



③ Given data

Items	Ordinary breads	fruit bread	cakes & pastries	B. cuits	others	Total
Sales (Rs)	260	40	100	60	20	480.

Total value of sales in one day = 480 Rs

This total value is to be represented on a 360° circle

Let the contribution of each rupee on pie chart be $x°$.

Total value of sales = Rs 480

∴ Total contribution of sales on pie chart

⇒ Total value × Contribution of each rupee

⇒ $480 \times x$

⇒ $480x$ —— ①

$\therefore$ But total angle $= 360^\circ \rightarrow (2)$

$\therefore$ (1) = (2).

$\Rightarrow 480x = 360$

$x = \frac{360}{480}$

$x = \frac{3}{4}^\circ$

$\therefore$ Contribution of each rupee on pie chart $= \frac{3}{4}^\circ$.

$\therefore$

Contribution of ordinary bread sales on pie chart

$\Rightarrow$ sales $\times$ contribution of each rupee

$\Rightarrow 260 \times \frac{3}{4}$

$\Rightarrow 195^\circ$.

Similarly contribution of

fruit bread $=$ sales $\times x$

$= 40 \times \frac{3}{4}$

$= 30^\circ$

Cakes & pastries $= 100 \times x$

$= 100 \times \frac{3}{4}$

$= 75^\circ$

Biscuits $=$ sales of Biscuits $\times$ x (rupee contribution)

$= 60 \times \frac{3}{4}$

Biscuits $= 45^\circ$

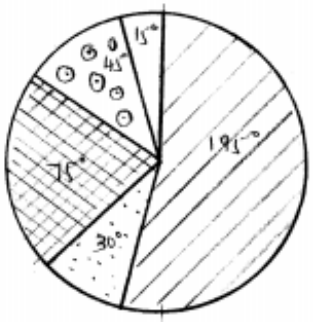
Others = sol.value for others × supea. value

= 20 × x.

= 20 × 3/4

Others = 15°

∴ The pie chart is given by



- ordinary bread
- cakes & pastries
- fruit bread.
- Biscuits.
- others.

④ Given data

items	Rent	Education	food	clothing	others
Amount of expenditure (Rs)	2700	1800	2400	1500	2400

Total amount of expenditure

⇒ 2700 + 1800 + 2400 + 1500 + 2400

⇒ ~~1,08,00~~

⇒ Rs 10,800

∴ Total amount of expenditure = 10,800 Rs

b) This amount is to be represented on a pie chart.

let the contribution of each rupee on pie chart be $x°$.

∴ Total contribution of expenditure = Total expenditure × contribution of each rupee

$\Rightarrow 10,800 \times x$

∴ But total angle = 360°

$\therefore 10800x = 360$

$x = \frac{360}{10800}$

$x = \frac{1}{30}°$

Contribution of each rupee on pie chart = $\frac{1}{30}°$.

∴ Contribution of expenditures

Rent = $2700 \times x$

$= 2700 \times \frac{1}{30}$

Rent = 90°

Education = $1800 \times x$

$= 1800 \times \frac{1}{30}$

Education = 60°

food = 2400 x ?x

= 2400 x $\frac{1}{30}$

food = 80°

clothing = 1500 x ?x

= 1500 x $\frac{1}{30}$

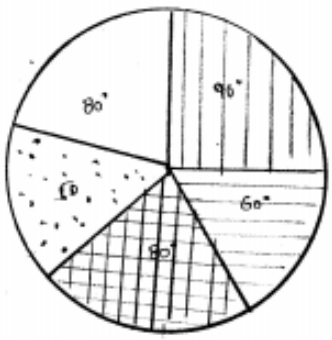
clothing = 50°.

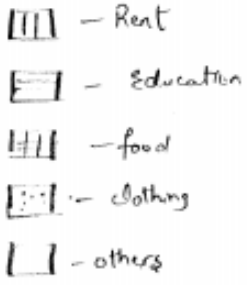
Others = 2400 x ?x

= 2400 x $\frac{1}{30}$

Others = 80°

∴ The pie chart is given as.





(5) Given data

Categories	Cultivators	Agri labourers	industry workers	commercial workers	others
% of workers	40	25	12.5	10	12.5

Total % of workers $= 40 + 25 + 12.5 + 12.5 + 10$

$= 100\%$

This 100% should be represented on a pie chart.

Let the contribution of 1% on pie chart be $x°$

$\therefore$ Total contribution = Total % $\times$ contribution of 1%

$= 100 \times x$

$= 100x \quad - (1)$

$\therefore$ But total angle $= 360° \quad - (2)$

$\therefore 100x° = 360° \quad \{\because (1) = (2)\}$

$\boxed{x = 3.6°}$

$\therefore$ Contribution of 1% on pie chart is $3.6°$.

$\therefore$ Contribution of

$\rightarrow$ Cultivators = % of workers $\times x$

$= 40 \times x$

$= 144°$

Agricultural labourers

$\Rightarrow$ % of workers $\times$ x

$\Rightarrow$ 25×3.6

$\Rightarrow$ 90°

Industrial workers $\Rightarrow$ % of workers $\times x$

$\Rightarrow$ 12.5×3.6

$\Rightarrow$ 45°

Commercial workers $\Rightarrow$ % of workers $\times x$

$\Rightarrow$ 10×3.6

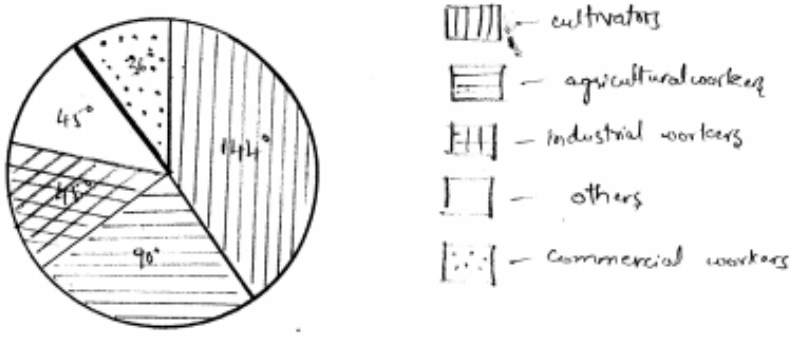
$\Rightarrow$ 36°

others $\Rightarrow$ % of workers $\times x$

$\Rightarrow$ 12.5×3.6

$\Rightarrow$ 45°

$\therefore$ The pie chart is given by.



⑥ Given data.

Items	Paper	Printing	Binding	Advertising	Miscellaneous
Expenditure (in %)	35%	20%	10%	5%	30%

Total Expenditure 100% to be represented on a pie chart.

Let 1% Expenditure be contribution on of pie chart is be $x°$.

∴ Total Contribution = Total Expenditure × Contribution of 1% Expenditure

$\Rightarrow 100 \times x$

Total angle $= 360°$

$\therefore 100 \times x = 360$

$\boxed{x = 3.6°}$

Contribution of 1% Expenditure is $3.6°$ on pie chart.

∴ Contribution of

Paper expenditure $= 35 \times x$

$= 35 \times 3.6$

$= 126°$

Printing expenditure $= 20 \times x$

$= 72°$

Binding expenditure $= 10 \times x$

$= 36°$

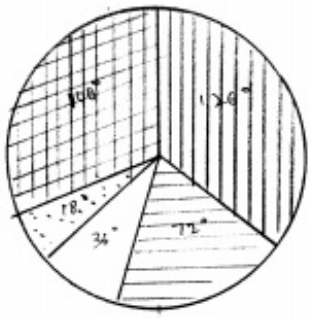
Advertising expenditure $= 5 \times x$

$= 18°$

Miscellaneous $= 30 \times x$

$= 108°$

∴ The given pie chart is :-



(7) Given data

Items	Wheat	pulses	Jawar	Groundnuts	vegetables	Total
%	$\frac{125}{3}$	$\frac{125}{6}$	$\frac{25}{2}$	$\frac{50}{3}$	$\frac{25}{3}$	100

100 % should be represented on a pie chart.

$x°$ be contribution of each % on pie chart

$\therefore$ Total contribution $= 100 \times x$

$= 100x°$

But total angle $= 360°$

$\therefore \quad 100x = 360$

$x = 3.6°$

contribution of 1% on pie chart is $3.6°$.

$\therefore$ Contribution of

wheat $= \frac{125}{3} \times x$

$= \frac{125}{3} \times 3.6$

wheat $= 150°$

pulses $= \frac{125}{6} \times x$

$= \frac{125}{6} \times 3.6$

$= 75°$

Jawar $= \frac{25}{2} \times x$

$= 45°$

Groundnuts $= \frac{50}{3} \times x$

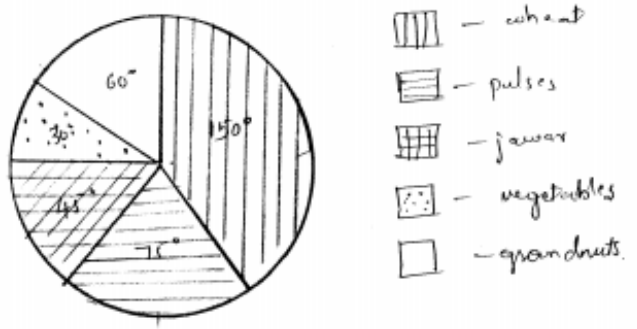
$= \frac{50}{3} \times 3.6$

$= 60°$

Vegetables $= \frac{25}{3} \times 3.6$

$= 30°$

∴ The pie chart is given as.



(8) Given data

Items	food	clothing	rent	Education	Unforeseen events	medicine
Expenditure (%)	40%	20%	10%	10%	15%	5%

Total % = 100%

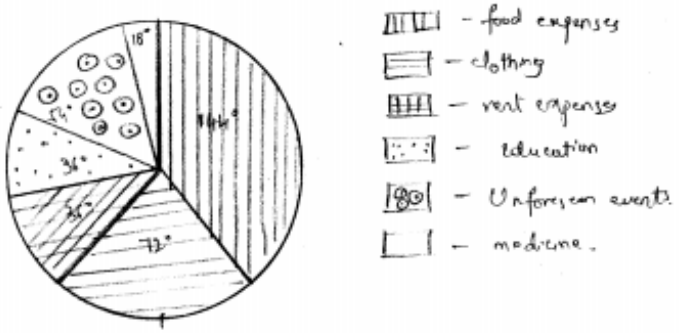
100% is to be represented on a pie chart.

let $x°$ be the contribution of each % on pie chart.

∴ Total contribution = Total % × x

= 100 % × x

∴ The pie chart is given by



(9) Given data

Continents	Asia	USSR	Africa	Europe	N.Amer	S.America	Austr
Area (km^2)	26.9	20.5	30.3	4.9	24.3	17.9	8.5

Total area = 26.9 + 20.5 + 30.3 + 4.9 + 24.3 + 17.9 + 8.5

Total area = 133.3 km^2 (million km)^2

Total area to be represented on pie chart

let $x°$ be contribution of 1 sq.mkm area on pie chart

∴ Total ° contribution = Total area × contribution of $1km^2$ area

= 133.3 × $x°$

= 133.3$x°$

But total angle $= 360°$

$\therefore 1333x = 360$

$x = \frac{3600°}{1333}$

$\therefore$ Contribution of each square million km is $\frac{3600°}{1333}$.

$\therefore$ Contribution of

Asia $= 26.9 \times x$

$= 26.9 \times \frac{3600}{1333}$

Asia $= 72.64°$

USSR $= 20.5 \times \frac{3600}{1333}$

$= 55.36°$

Africa $= 30.3 \times \frac{3600}{1333}$

Africa $= 81.83°$

Europe $= 4.9 \times \frac{3600}{1333}$

$= 13.23°$

North America $= 24.3 \times \frac{3600}{1333}$

$= 65.62°$

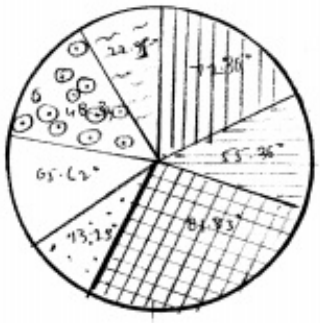
South America = $17.9 \times \frac{3600}{1333}$

$= 48.34°$

Australia = $8.5 \times \frac{3600}{1333}$

$= 22.95°$

The pie chart is given as:-



- Asia
- USSR
- Africa
- Europe
- North America
- South America
- Australia.

(10) Given data

Items	Cement	Timber	Bricks	Labour	Steel	Miscellaneous
Expenditure (in 1000 Rs)	60	30	45	75	45	45

Total Expenditure = 60 + 30 + 45 + 75 + 45 + 45

= Rs 300,000

Rs 300 thousand to be represented on a pie chart

let $x°$ be contribution by each thousand Rupee on pie chart.

$\therefore$ Total contribution $= 300 \times x°$

But Total angle $= 360°$.

$\therefore \quad 300 \times x = 360°$

$$\boxed{x = 1.2°}$$

$\therefore$ The contribution of each thousand rupee on pie chart is $1.2°$.

$\therefore$ The contribution of

Cement $= 60 \times x$

$= 72°$

Timber $= 30 \times x$

$= 36°$

Bricks $= 45 \times x$

$= 54°$

Labour $= 75 \times x$

$= 90°$

Steel $= 45 \times x$

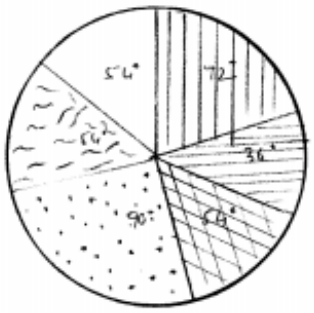
$= 54°$

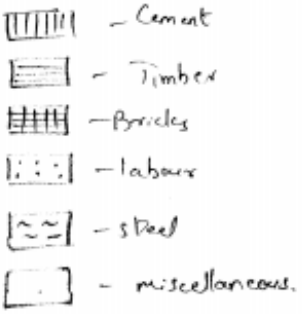
Miscellaneous $= 45^\circ \times x$

$= 45^\circ \times 1.2$

$= 54^\circ$

The pie chart is given by.





(ii) Given data

Items	food	Entertainment	Other expenditure	Savings
Expenditure (₹)	40	25	20	15

Total Expenditure $= 100$ ₹

Let x° be contribution of ₹ Expenditure on pie chart.

∴ Total contribution on pie chart $= 100x°$

But total angle $= 360°$

$\therefore 100x° = 360°$

$$\boxed{x = 3.6°}$$

∴ Contribution of each % on pie chart is $3.6°$

∴ Contribution of

food $= 40\% \times x$

$= 40 \times 3.6$

$= 144°$

Entertainment $= 25\% \times x$

$= 25 \times 3.6$

$= 90°$

other expenditure $= 20\% \times x$

$= 20 \times 3.6$

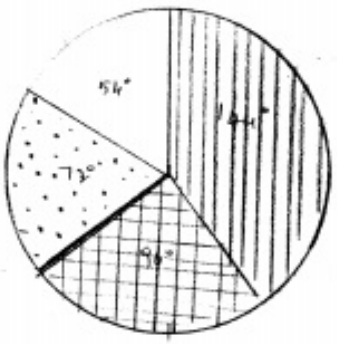
$= 72°$

Savings $= 15\% \times x$

$= 15 \times 3.6$

$= 54°$

The pie chart is given as:-



- food
- Entertainment
- other exp.
- Savings

(13) Given data

Printing	paper	Binding charges	Advertisement	Royalty	Miscellaneous
30%	15%	15%	20%	10%	15%

Total % = 105%

105% is to be contributed on a piechart.

Let 1% contribution on piechart be $x°$.

∴ Total contribution $= (105\% \times x°)$

But total angle $= 360°$.

$105\ x° = 360°$

$$\boxed{x = \frac{24°}{7}}$$

Contribution of 1% on piechart is $\frac{24°}{7}$.

∴ Contribution of

Printing $= 30 \times x°$

$= 30 \times \frac{24}{7}$

$= 102.85°$

paper $= 15 \times x°$

$= 51.42°$

Binding charges $= 15 \times x°$

$= 15 \times \frac{24}{7}$.

$= 51.42°$.

Advertisement $= 20 \times x°$.

$= 68.57°$.

Royalty $= 10 \times x$

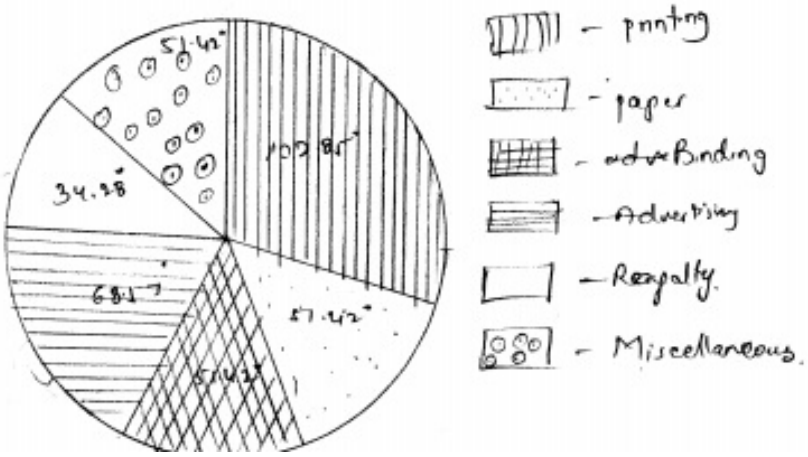
$= 34.28°$.

Miscellaneous $= 15 \times x°$

$= 15 \times \frac{24}{7}$.

$= 51.42°$.

∴ The pie chart is given as.



(14) Given data.

Items	wheat	Rice	Tea
production (metric tons)	3260	1840	900

Total production = 3260 + 1840 + 900

= 6000 Tons.

This total production is to be represented on a pie chart.

let contribution of 1 metric ton on pie chart be $x°$.

Total contribution = $6000x°$.

But total angle = 360°

$6000x° = 360°$.

$x° = \frac{360}{6000}$

$\boxed{x = 0.06°}$

∴ Contribution of each metric ton on p.e chart is 0.06°.

∴ Contribution of

wheat = $3260 \times x$

= 3260×0.06

= 195.6°.

Rice = 1840xx

= 1840x0.06

= ~~36.8°~~

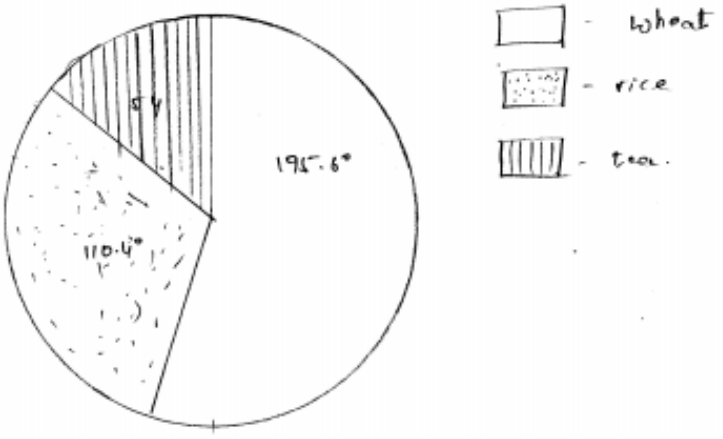
= 110.4°.

Tea = 900xx

= 900x 0.06.

= 54

The pie chart is given as.



(16) Given

percentages 12.6%, 18.2%, 17.5%, 20.3%, 2.8%,
4.2%, 9.8%, 14.7%

Total percentage = 100.1%

This percentage is to be represented by on a pie chart.

∴ let x° be contribution of each 1% on pie chart

∴ Total contribution = $100.1 \times x^\circ$

But total angle = 360°

∴ $100.1 x^\circ = 360^\circ$

$x^\circ = \frac{360}{100.1}$

$$\boxed{x^\circ = \frac{3600^\circ}{1001}}$$

∴ Contribution of each 1% on pie chart is $\frac{3600}{1001}^\circ$.

∴ Contribution of

12.6% $\Rightarrow 45.31^\circ$.

18.2% $= 18.2 \times \frac{3600}{1001}$

$= 65.41^\circ$.

17.5% $= 17.5 \times \frac{3600}{1001}$

$= 62.68^\circ$.

$20.3\% = 20.3 \times \frac{3600}{100}$

$= 73.006°$

$2.8\% = 2.8 \times \frac{3600}{100}$

$= 10.08°$

$4.2\% = 4.2 \times \frac{3600}{100}$

$= 15.104°$

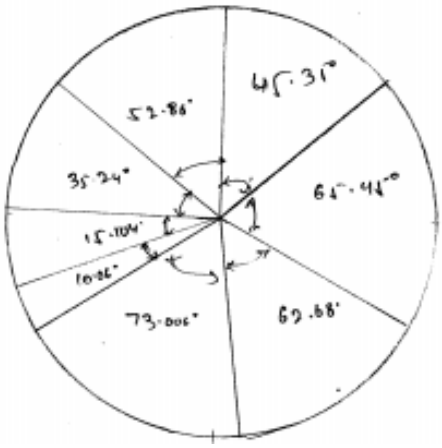
$9.8\% = 9.8 \times \frac{3600}{100}$

$= 35.28°$

$14.7\% = 14.7 \times \frac{3600}{100}$

$= 52.86°$

The pie chart is given as



(16) Given data

Items	food	clothing	rent	Education	fuel	Medicine
Expenditure (Rs)	1600	200	600	150	100	80

Miscellaneous
270

Total expenditure = 3000 Rs.

This total expenditure is to be represented on a pie chart.

Let contribution of each rupee be $x°$ on pie chart.

Total contribution = $3000x°$.

But total angle = $360°$.

$\therefore 3000x° = 360°$

$$x = \frac{3}{25}°$$

The contribution of each rupee on pie chart is $\frac{3}{25}°$.

$\therefore$ The contribution of

food = $1600 \times x°$

$= 1600 \times \frac{3}{25}$

$= 192°$

clothing = $200 \times x^\circ$

$= 200 \times \frac{3}{25}$

$= 24^\circ$

Rent = $600 \times x^\circ$

$= 600 \times \frac{3}{25}$

$= 72^\circ$

Education = $150 \times x^\circ$

$= 150 \times \frac{3}{25}$

$= 18^\circ$

fuel = $100 \times x^\circ$

$= 100 \times \frac{3}{25}$

$= 12^\circ$

Medicine = $80 \times x^\circ$

$= 80 \times \frac{3}{25}$

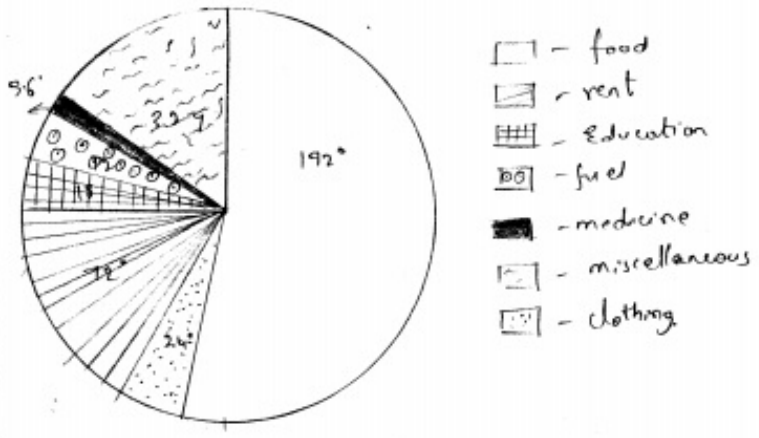
$= 9.6^\circ$

Miscellaneous = $270 \times x^\circ$

$= 270 \times \frac{3}{25}$

$= 32.4^\circ$

The pie chart is given as.



(17) Given data

Agriculture	irrigation & power	small indust'ry	Transport	Social service	miscellaneous
14·1.	16·1.	29·1.	17·1.	16·1.	8·1.

Total ·/. = 100·/. is to be represented on pie chart

let $x°$ be contribution of each ·/. on pie chart.

∴ Total contribution $= 100 \cdot /. \times x$

$= 100x$.

But total angle = 360.

∴ $100x = 360$

$\boxed{x = 3.6°}$

∴ Contribution of .

agriculture = 14.1. x x°

= 14 x 3.6

= 50.4°

irrigation = 16/. x x°

= 57.6°.

small industries = 29/. x x°

= 104.4°.

Transport = 17.1. x x°

= 17 x 3.6

= 61.2°

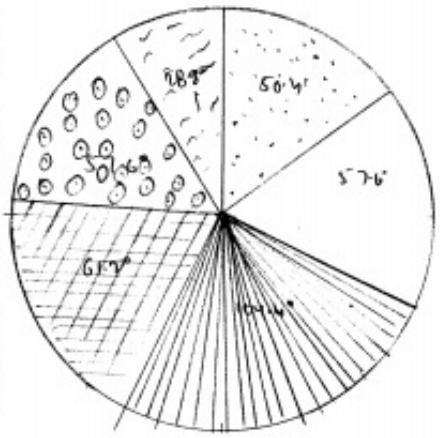
Social service = 16/. x x°

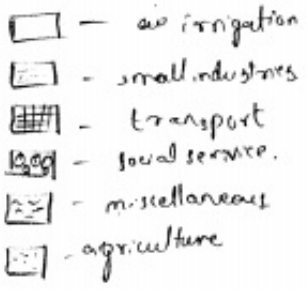
= 57.6°

miscellaneous = 8/. x x°

= 8 x 3.6

= 28.8°.





① Given data

angles of pie chart.

steel = 45°, labour = 100°

Timber = 100°, cement = 75°

Brick = 50° | Total angle = 370°

Expenditure incurred on cement is Rs 112500

i.e for 75° cost incurred is 112500

∴ Total cost = $\frac{370}{75} \times 112500$

Total cost = 55,500 Rs

Expenditure incurred on labour

$= \frac{100}{370} \times$ Total cost

$= \frac{100}{370} \times 55,500.$

$= 15,000$ Rs.

∴ Expenditure incurred on labour is Rs 15,000

(2) Given angles of pie chart

Maize - 30°

wheat - 120°, Gram - 50°, Rice - 60°, sugar - 100°.

Given total production = 81,000 tonnes.

i.e. total production = 360° ⟶ 81,000 tonnes

$\therefore$ $1^\circ \longrightarrow \frac{81,000}{360^\circ}$

$\therefore$ production of wheat $= 120 \times \frac{81,000}{360}$

$= 27,000$ tonnes.

production of sugar $= 100 \times \frac{81,000}{360}$

$= 22,500$ tonnes.

production rice $= 60 \times \frac{81000}{360}$

$= 13,500$ Tonnes

production of maize $= 30 \times \frac{81000}{360}$

$= 6,750$ Tonnes.

production of gram $= 50 \times \frac{81000}{360}$

$= 11,250$ Tonnes.

③ Given

no of students for science = 1000

pie angles for

Science = 100°
arts = 120°
Commerce = 65°
law = 45°
Education = 36°

∴ no. of students for science ⇒ 100° for a, 1000

100° ⟶ 1000

total no. of students ⟶ 360.

100° ⟶ 1000
360° ⟶ x

∴ $x = \frac{360 \times 1000}{100}$

$\boxed{x = 3600}$

Total no. of students = 3600

no. of students of arts = $\frac{120}{360} \times 3600$

= 1200

ratio of students in science & arts = $\frac{\text{no. of science students}}{\text{no. of arts students}}$

= $\frac{1000}{1200}$

= (5/6)

ratio of science & arts students = 5 : 6.

(4) Given total marks = 440.

Given angles of pie chart

maths = 108°

science = 81°

English = 72°

Hindi = 54°

Social science = 45°

total marks ⇒ 360° → 440°

marks in maths ⇒ $\frac{108}{360} \times 440$

⇒ 132

marks in science = $\frac{81}{360} \times 440$

= 99

marks in English = $\frac{72}{360} \times 440$

= 88

marks in Hindi = $\frac{54}{360} \times 440$

= 66

marks in Social = $\frac{45}{360} \times 440$

= 55

(5) Given

students scored in maths = 135

pie chart angles

Maths - 90° Hindi - 60°

Science - 76°

social - 72°

English - 62°

Maths score = $\frac{90}{360}$ × Total marks = 135

$\therefore$ Total marks = 135 × 4

= 540

$\therefore$ Total marks scored = 540

Marks in science = $\frac{76}{360} \times 540$

= 114

marks in social = $\frac{72 \times 540}{360}$

= 108

marks in English = $\frac{62}{360} \times 540$

= 93

marks in Hindi = $\frac{60}{360} \times 540$

= 90