SOLUTIONS

1. For military tent

Diameter of the base = 4 m

∴Radius of the base (r) = $\frac{4}{2}$ m = 2m = 20 dm

Height (h) = 21 dm

∴ Volume of air in the tent = $\frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times (20)^2 \times 21 = 8800\ dm^3$

∵ 16 men sleep in the tent

∴ Average space per man = $\frac{8800}{16}$ = 550 dm^3

∴ The average number of cubic decimetres of air surface per man is 550.

2. $\frac{2+\sqrt{3}}{2-\sqrt{3}} + \frac{2-\sqrt{3}}{2+\sqrt{3}} + \frac{\sqrt{3}-1}{\sqrt{3}+1}$

$= \frac{2+\sqrt{3}}{2-\sqrt{3}} \times \frac{2-\sqrt{3}}{2-\sqrt{3}} + \frac{2-\sqrt{3}}{2+\sqrt{3}} \times \frac{2-\sqrt{3}}{2-\sqrt{3}} + \frac{\sqrt{3}-1}{\sqrt{3}+1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1}$

According to the formula $a^2 - b^2 = (a + b)(a - b)$

$= \frac{(2+\sqrt{3})^2}{2^2-\sqrt{3}^2} + \frac{(2-\sqrt{3})^2}{2^2-\sqrt{3}^2} + \frac{(\sqrt{3}-1)^2}{\sqrt{3}^2-1}$

$= \frac{2^2+2\times2\sqrt{3}+\sqrt{3}^2}{4-3} + \frac{2^2-2\times2\sqrt{3}+\sqrt{3}^2}{4-3} + \frac{\sqrt{3}^2-2\sqrt{3}+1}{3-1}$

$= \frac{4+4\sqrt{3}+3}{1} + \frac{4-4\sqrt{3}+3}{1} + \frac{3-2\sqrt{3}+1}{2}$

$= 7 + 4\sqrt{3} + 7 - 4\sqrt{3} + \frac{4-2\sqrt{3}}{2}$

3. Given, P and Q are mid-points of AB and CD.

Now, AB||CD,

∴AP || QC

Also, AB = DC

$\frac{1}{2}$AB = $\frac{1}{2}$DC

AP = QC

Now, AP || QC and AP = QC

∴APCQ is a parallelogram.

AQ || PC or SQ || PR

Again,

AB || DC ⇒ $\frac{1}{2}$AB = $\frac{1}{2}$DC

∴BP = QD

Now, BP||QD and BP = QD

∴BPDQ is a parallelogram

So, PD||BQ or PS||QR

Thus, SQ||RP and PS||QR

∴PQRS is a parallelogram.

4. Construction: Draw BP II DC

$\angle APE = \angle DCE$ (Corresponding angles)

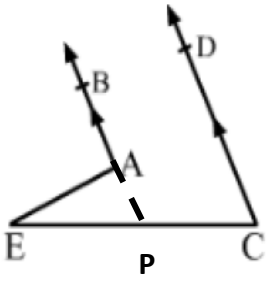
In ΔAPE with exterior angle $\angle BAE$

$\angle AEP + \angle APE = \angle BAE$

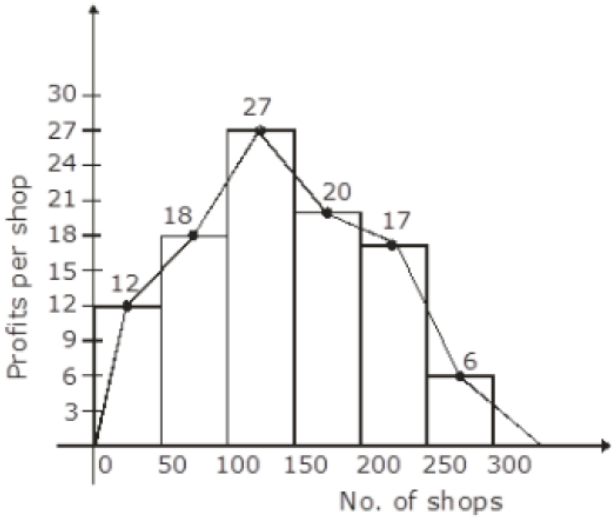
$\Rightarrow \angle AEP + \angle DCE = \angle BAE$

$\Rightarrow \angle AEP = \angle BAE - \angle DCE$

Hence proved



5. Monthly profits (in Rs) of 100 shops



6. i. In ΔAOP and ΔBOP

$\angle$APO = $\angle$BPO (Given)

OP = OP (Common)

AO = OB (radius of circle)

ΔAOP $\cong$ ΔBOP

AP = BP (CPCT)

ii. In right ΔCOQ

$CO^2 = OQ^2 + CQ^2$

$\Rightarrow 10^2 = 8^2 + CQ^2$

$\Rightarrow CQ^2 = 100 - 64 = 36$

$\Rightarrow$ CQ = 6

CD = 2CQ

$\Rightarrow$ CD = 12 cm

iii. In right ΔAOB

$AO^2 = OP^2 + AP^2$

$\Rightarrow 10^2 = 6^2 + AP^2$

$\Rightarrow AP^2 = 100 - 36 = 64$

$\Rightarrow AP = 8$

$AB = 2AP$

$\Rightarrow AB = 16$ cm

OR

There is one and only one circle passing through three given non-collinear points.

7. i. x - 2y = 10

ii. x + y = 55 ...(i) and x - 2y = 10 ...(ii)
Subtracting (ii) from (i)
x + y - x + 2y = 55 - 10
3y = 45
y = 15
So present age of Reeta is 15 years.

iii. x + y = 55 ...(i) and x - 2y = 10 ...(ii)
Subtracting (ii) from (i)
x + y - x + 2y = 55 - 10
3y = 45
y = 15
Put y = 15 in equation (i)
x + y = 55
x + 15 = 55
x = 55 − 15 = 40
So Ranjeet's present age is 40 years.

iv) Let Reeta;s mother age be 'z'.

Given Reeta age : Her mother age = 7 : 5

We know that Reeta age = 15 years

$\frac{Mother\ age}{Reeta\ age} = \frac{7}{5}$

$\Rightarrow z = \frac{7}{3} \times y$

$\Rightarrow z = \frac{7}{3} \times 15$

$\Rightarrow$ Here Mother age = 35 years

Hence Reeta's mother's age is 35 years.