Model Solutions

CBSE Class 10 Mathematics – SET 5

The paper solved the way a student should write it in the answer book: every step, every keyword and every labelled diagram that earns marks.

How to read this script

Black ink is the written answer, as in the board answer book.

Pencil is used for every diagram, neatly labelled.

[2] at the right edge shows the marks for that question.

Marks are shown for every question, as in the marking scheme.

Written in a neat handwriting style to show how a model answer should look.

Always check the answer against your textbook. Questions: support@zyllabo.com

Section A

Ans 1. Ans. (d) 4 [1]

$144=2^4\times3^2$, so the exponent of 2 is 4.

Ans 2. Ans. (a) $-\frac{2}{3}$ [1]

Sum $=-\frac{2}{k}$ and product $=\frac{3k}{k}=3$.

$-\frac{2}{k}=3$, so $k=-\frac{2}{3}$.

Ans 3. Ans. (b) 6 [1]

Multiply the first by 2 and the second by 3: $4x+6y=24$ and $9x-6y=15$.

Adding: $13x=39$, so $x=3$ and $y=2$. $xy=6$.

Ans 4. Ans. (c) no real roots [1]

$D=(\sqrt{5})^2-4(2)(1)=5-8=-3<0$.

So the equation has no real roots.

Ans 5. Ans. (d) 960 [1]

The multiples are $8,16,\ldots,120$: $a=8$, $l=120$, $n=15$.

$S_{15}=\frac{15}{2}(8+120)=960$.

Ans 6. Ans. (b) $\left(0,\frac{7}{2}\right)$ [1]

The centre is the midpoint of the diameter.

$\left(\frac{-6+6}{2},\frac{3+4}{2}\right)=\left(0,\frac{7}{2}\right)$.

Ans 7. Ans. (a) right-angled [1]

$7^2+24^2=49+576=625=25^2$.

By the converse of Pythagoras theorem, the triangle is right-angled.

Ans 8. Ans. (c) SSA [1]

AA, SSS and SAS are similarity criteria. SSA is not a criterion for similarity.

Ans 9. Ans. (c) 3 cm [1]

For a quadrilateral circumscribing a circle, $AB+CD=AD+BC$.

$6+4=7+BC$ so $BC=3$ cm.

Ans 10. Ans. (a) $\frac{49}{64}$ [1]

The expression $=\frac{1-\sin^2\theta}{1-\cos^2\theta}=\frac{\cos^2\theta}{\sin^2\theta}=\cot^2\theta$.

$=\frac{49}{64}$.

Ans 11. Ans. (b) 4 [1]

$\sin 68^\circ=\cos 22^\circ$, so $\sin^2 22^\circ+\sin^2 68^\circ=1$.

$\cot^2 30^\circ=3$. Total $=1+3=4$.

Ans 12. Ans. (d) 2 [1]

$=2(\sin^2\theta+\cos^2\theta)=2$.

Ans 13. Ans. (b) $75\sqrt{3}$ m [1]

$\tan 30^\circ=\frac{75}{d}$, so $d=75\sqrt{3}$ m.

Ans 14. Ans. (d) 36 cm [1]

Perimeter $=\pi r+2r=22+14=36$ cm.

Ans 15. Ans. (c) 462 cm^2 [1]

TSA $=3\pi r^2=3\times\frac{22}{7}\times 49=462\ cm^2$.

Ans 16. Ans. (a) median [1]

The x-coordinate of the point of intersection of the two ogives is the median.

Ans 17. Ans. (c) 21.5 [1]

$\Sigma f=20$ and $\Sigma fx=3(5)+5(15)+8(25)+4(35)=15+75+200+140=430$.

Mean $=\frac{430}{20}=21.5$.

Ans 18. Ans. (a) $\frac{2}{11}$ [1]

MATHEMATICS has 11 letters and the letter M appears twice.

$P=\frac{2}{11}$.

Ans 19. Ans. (a) [1]

$LCM=\frac{9\times12}{3}=36$, so A is true, and R is the relation used to get it.

Ans 20. Ans. (d) [1]

4–2=2 but 8–4=4, so the difference is not constant and A is false. R is true.

Section B

Ans 21. $7\times11\times13+13=13(7\times11+1)=13\times78$. [2]

It has factors other than 1 and itself, so it is composite.

Ans 22. (A) Adding: $200x+200y=1000$, so $x+y=5$. [2]

Subtracting: $2x-2y=2$, so $x-y=1$.

Hence $x=3$ and $y=2$.

Ans 23. $x^2-5x+2x-10=0$, so $x(x-5)+2(x-5)=0$. [2]

$(x-5)(x+2)=0$, so $x=5$ or $x=-2$.

Ans 24. $PQ^2=(1-x)^2+(15-7)^2=100$. [2]

$(x-1)^2+64=100$, so $(x-1)^2=36$.

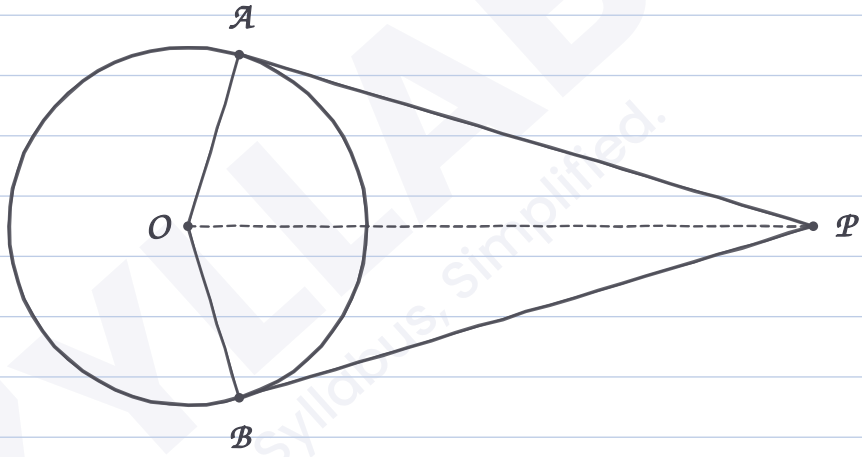
$x-1=\pm 6$, so $x=7$ or $x=-5$.

Ans 25. (A) $\cos^2\theta=1-\frac{9}{25}=\frac{16}{25}$, so $\cos\theta=\frac{4}{5}$. [2]

$\tan\theta=\frac{\sin\theta}{\cos\theta}=\frac{3}{4}$.

Section C

Ans 26. $OA\perp PA$, so $\triangle OAP$ is right-angled at A. [3]



$PA^2=OP^2-OA^2=169-25=144$, so $PA=12$ cm.

$PB=PA=12$ cm (tangents from an external point).

Area of $OAPB=2\times\frac{1}{2}\times OA\times PA=5\times 12=60$ cm^2.

Ans 27. Assume that $5-2\sqrt{3}$ is rational, say $\frac{p}{q}$, where p,q are integers and $q\neq 0$. [3]

$2\sqrt{3}=5-\frac{p}{q}=\frac{5q-p}{q}$, so $\sqrt{3}=\frac{5q-p}{2q}$.

The right side is rational but $\sqrt{3}$ is irrational. This is a contradiction.
Hence $5-2\sqrt{3}$ is irrational.

Ans 28. (A) $4s^2-4s+1=(2s-1)^2$, so the zeroes are $\frac{1}{2}$ and $\frac{1}{2}$. [3]

$\text{Sum} = \frac{1}{2}+\frac{1}{2}=1=\frac{-(-4)}{4}$.

$\text{Product} = \frac{1}{2}\times\frac{1}{2}=\frac{1}{4}=\frac{1}{4}$ (that is $\frac{c}{a}$).
The relationship is verified.

Ans 29. $LHS = \frac{\sin^2\theta+(1+\cos\theta)^2}{\sin\theta(1+\cos\theta)}$ [3]

$=\frac{\sin^2\theta+1+2\cos\theta+\cos^2\theta}{\sin\theta(1+\cos\theta)}=\frac{2+2\cos\theta}{\sin\theta(1+\cos\theta)}$

$=\frac{2(1+\cos\theta)}{\sin\theta(1+\cos\theta)}=\frac{2}{\sin\theta}=2\ \text{cosec}\ \theta = RHS.$

Ans 30. (A) $AB=\sqrt{9+25}=\sqrt{34}$, $BC=\sqrt{25+9}=\sqrt{34}$. [3]
$CD=\sqrt{9+25}=\sqrt{34}$, $DA=\sqrt{25+9}=\sqrt{34}$.
$AC=\sqrt{4+64}=\sqrt{68}$ and $BD=\sqrt{64+4}=\sqrt{68}$.
All four sides are equal and the diagonals are equal, so ABCD is a square.

Ans 31. Let a pencil cost Rs x and a pen cost Rs y. $5x+7y=50$ ... (1) and $7x+5y=46$ ... (2) [3]
Adding: $12x+12y=96$, so $x+y=8$. Subtracting (1) from (2): $2x-2y=-4$, so $x-y=-2$.
$x=3$ and $y=5$.

One pencil costs Rs 3 and one pen costs Rs 5.

Section D

Ans 32. Let A take x days. Then B takes $(x+6)$ days. [5]

$\frac{1}{x}+\frac{1}{x+6}=\frac{1}{4}$, so $4(2x+6)=x(x+6)$.

$x^2-2x-24=0$, so $x^2-6x+4x-24=0$.

$(x-6)(x+4)=0$, so $x=6$ (rejecting -4).

A alone takes 6 days and B alone takes 12 days.

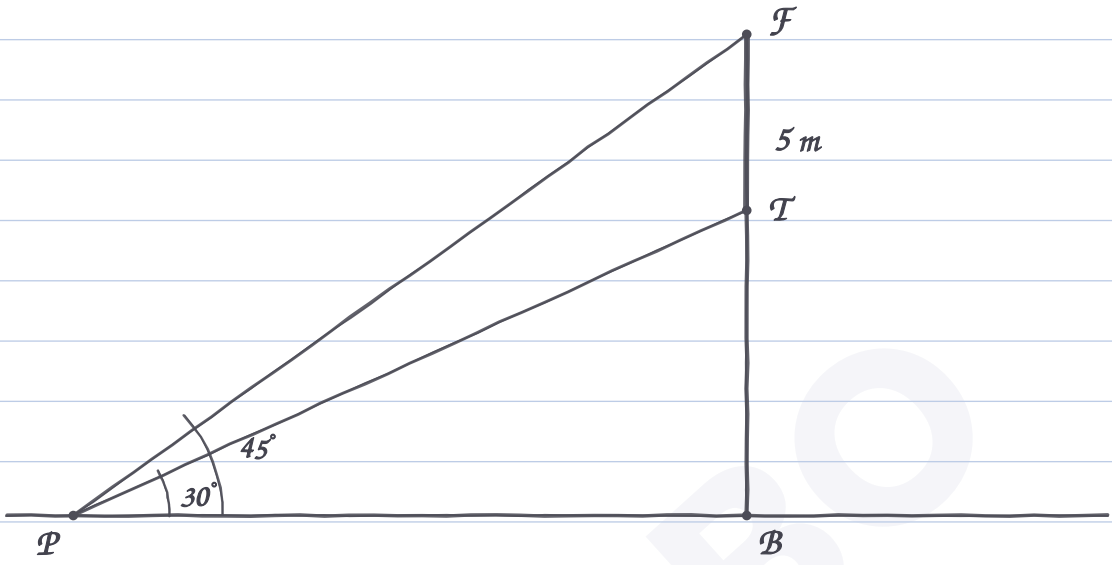
Ans 33. (A) The numbers are 6,12,18,…, an AP with $a=6$ and $d=6$. [5]

$n=40$: $a_{40}=6+39\times6=240$.

$S_{40}=\frac{40}{2}(6+240)=20\times246$

$=4920$.

Ans 34. Let the tower $BT=h$ m, $PB=d$ m. The flagstaff $TF=5$ m. [5]



In $\triangle PBT$: $\tan 30^\circ = \frac{h}{d}$, so $d=\sqrt{3}\ h$.

In $\triangle PBF$: $\tan 45^\circ = \frac{h+5}{d}=1$, so $d=h+5$.

$\sqrt{3}\ h=h+5$, so $h(\sqrt{3}-1)=5$.

$$h=\frac{5}{\sqrt{3}-1}\times\frac{\sqrt{3}+1}{\sqrt{3}+1}=\frac{5(\sqrt{3}+1)}{2}$$

$h=\frac{5\times 2.73}{2}=6.825$ m. The tower is about 6.83 m high.

Ans 35. (A) Take assumed mean $a=225$ and $h=50$; $u_i=\frac{x_i-225}{50}$. [5]

Class	f_i	x_i	u_i	f_iu_i
100–150	4	125	−2	−8
150–200	6	175	−1	−6
200–250	15	225	0	0
250–300	17	275	1	17
300–350	8	325	2	16
Total	50			19

$$\text{Mean} = a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h = 225 + \frac{19}{50} \times 50$$
$$= 225 + 19 = 244.$$

Section E

Ans 36. Case study [4]

(i) $V = \pi r^2 h = \frac{22}{7} \times 14 \times 14 \times 24 = 14784 \text{ cm}^3$. [1]

(ii) $V = \frac{1}{3}\pi R^2 h = \frac{1}{3}\pi R^2 \times 18 = 6\pi R^2$. [1]

(iii) The volume of sand is the same: $6\pi R^2 = \pi \times 14^2 \times 24 = 4704\pi$. [2]

$R^2 = 784$, so $R = 28$ cm.

Ans 37. Case study [4]

(i) Length $= (2x+1)$ m. Area: $x(2x+1) = 300$, so $2x^2 + x - 300 = 0$. [1]

(ii) $D = 1^2 - 4(2)(-300) = 1 + 2400 = 2401$. [1]

(iii) $\sqrt{D} = 49$, so $x = \frac{-1 \pm 49}{4}$. Since $x > 0$, $x = 12$. [2]

Breadth $= 12$ m and length $= 2(12) + 1 = 25$ m.

Ans 38. **Case study** [4]

(i) Total outcomes =36. Sum 9: (3,6),(4,5),(5,4),(6,3) that is 4. $P=\frac{4}{36}=\frac{1}{9}$. [1]

(ii) Doublets: (1,1),…,(6,6), that is 6. $P=\frac{6}{36}=\frac{1}{6}$. [1]

(iii) Sum 2: 1; sum 3: 2; sum 5: 4; sum 7: 6; sum 11: 2. Total =15. [2]

$P=\frac{15}{36}=\frac{5}{12}$.

ZYLLABO Syllabus, Simplified.