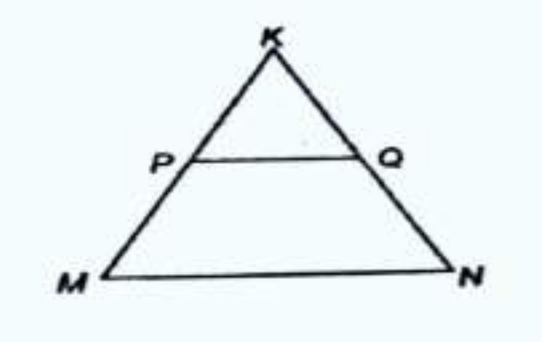
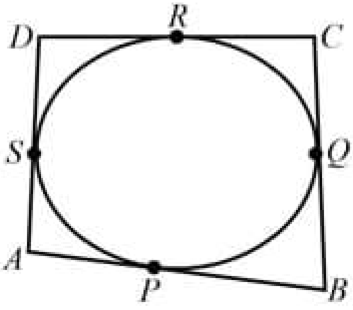
MARKING SCHEME
Mock Test 07 Standard Maths 041

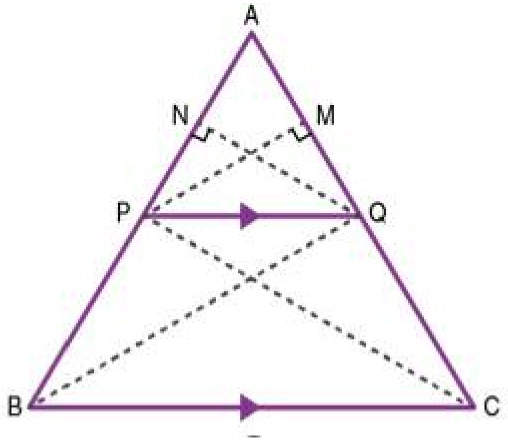
	SECTION A	
	Section A consists of 20 questions of 1 mark each.	
1.	(c) 3, 420	1
2.	(b) $x^2 + 4x + 4$	1
3.	(b) 55 cm	1
4.	(c) 5	1
5.	(c) 5 / 12	1
6.	c) $ac=b^2$ / 4	1
7.	b) 20 cm	1
8.	b) 7.	1
9.	(c) 2	1
10.	(c) 3	1
11.	(b) 1 / 2	1
12.	(d) 5cm	1
13.	(d) 3/13 cm	1
14.	(c) $17x$	1
15.	(a) 3.5	1
16.	(b) 5 cm	1
17.	(c) similar but not congruent.	1
18.	(a) 1/2	1
19.	(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)	1
20.	(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)	1
	SECTION B	
	Section B consists of 5 questions of 2 marks each.	
21.	AP is 60,63, 66, …, Here a=60, d = 63-60 = 3 using the formula Sn = n/2 {2a+(n-1)d} = 20/ 2 [120+57] =1770. Or We can write 2x+1–(x+3)=(x-7)–(2x+1) 2x+1-x-3=x-7-2x-1 x-2=-x-8 x+x=-8+2	1 1 Or 1

	2x=-(6) value of x is -3.	1
22.	 In ΔKMN, we have PQ ∥ MN , ∴KP / PM = KQ / QN [Basic proportionality Theorem] 4 /13= KQ / (20.4 – KQ) ⇒ 4(20.4 − KQ) = 13KQ ⇒ 81.6 − 4KQ = 13KQ ⇒ 17KQ = 81.6 KQ= 81.6/17= 4.8 cm	1 1
23.	R.H.S. = $x^2 + y^2 = (a \cos \theta - b \sin \theta)^2 + (a \sin \theta + b \cos \theta)^2$ = $a^2\cos^2 \theta + b^2 \sin^2 \theta - 2ab \cos \theta \sin \theta + a^2 \sin^2\theta + b^2 \cos^2 \theta + 2ab \sin \theta \cos \theta$ $= a^2(\cos^2 \theta + \sin^2\theta) + b^2 (\sin^2 \theta + \cos^2 \theta)$ $= a^2 + b^2$ = L.H.S Or $4 + 4 \tan^2 A = 4 (1 + \tan^2 A)$ $= 4 (\sec^2 A)$ $= 4 (5/2)^2 = 25$	1 1 Or 1 1
24.	$\angle ABQ$= 1 / 2 X 58= 29^0 , $\angle BAT$= 90^0, $\angle ATB$ = 180^0− (90+29) = 61^0	1 1
25.	Length of minute hand can be considered as radius (r) = 14 cm. In 60 minutes the minute hand rotates 360°. So, in 5 minutes, it will rotate = $\frac{360°}{60} \times 5 = 30°$. We know that, Area of sector of angle θ and radius r = $\frac{\theta}{360°} \times \pi r^2$ Substituting values we get : ⇒ Area $= \frac{30°}{360°} \times \frac{22}{7} \times 14^2 = \frac{1}{12} \times 22 \times 2 \times 14 = \frac{154}{3}$ cm^2. Hence, the area swept by the minute hand in 5 minutes = $\frac{154}{3}$ cm^2	1 1
	SECTION C	
	Section C consists of 6 questions of 3 marks each.	
26.	Let us assume on the contrary that 3 + 2√5 is rational. Then, there exist co-prime positive integers a and b such that 3 + 2√5 = a/b => 2√5 = a/b – 3	1

	=>$\sqrt{5}$ =($a-3b$)/ $2b$ Since, a and b are integers and thus $a-3b$ / $2b$ is a rational number. Thus $\sqrt{5}$ is rational. But this contradicts the fact that $\sqrt{5}$ is irrational. So, our assumption is incorrect. Hence, 3 + 2$\sqrt{5}$ is an irrational number.	1 1
27.	Let p(x) = $4x^2$ - 4x +1 Zero of the polynomial is the value of x where p(x) = 0 Putting p(x) = 0 $4x^2$ - 4x +1 = 0 We find roots using splitting the middle term method $4x^2$ -2x - 2x +1 = 0, 2x(2x -1) - 1(2x -1) = 0 , (2x – 1)(2x -1) = 0 X=1/2,1/2 Splitting the middle term method. Therefore, α = 1/2 & β = 1/2 are the zeroes of the polynomial Now, Verifying relationship b/w zeroes and coefficients p(x) = $4x^2$ - 4x +1 Comparing with $ax^2 + bx + c$, a = 4 , We have to verify Sum of zeroes = $-(Coefficient\ of\ x)/(Coefficient\ of\ x^2)$ i.e. α + β = - $\boldsymbol{b/a}$, α + β = 1/2 + 1/2 = 2/2 = $-b/a$ = -(-4/4) = 1, α β = 1/2 × 1/2 = 1/4 , c/a = 1/4 Since, L.H.S = R.H.S Hence relationship between zeroes & coefficient is verified Or Let the zeros be α and β Sum of Zeroes of $2x^2$ +7x+6 is (α +β)= -7/2 Product =(α X β)= 3 3α + 3β =3(α + β)= 3X(-7/2)= (-21/2) product =3α.3β = 9(α.β) = 9x3 =27 so Polynomial = x^2- (sum of the roots) x + product of the roots x^2-(- 21/2)x +27	1 ½ 1 ½ Or 1 ½

	$x^2 + 21x/2 + 27 = 2x^2 + 21x + 54$	1 ½
28.	Let x be the fixed charge and y be the cost of food per day. For student A, who pays Rs. 1380 for 22 days of food:$x + 22y = 1380$(Equation 1) For student B, who pays Rs. 1680 for 28 days of food:$x + 28y = 1680$(Equation 2) To find the values of x and y we can subtract Equation 1 from Equation 2: $(x + 28y) - (x + 22y) = 1680 - 1380,$ 6y=300 $y = \frac{300}{6} = 50$ y=50 The cost of food per day (y)is 50 Now, substitute the value of y into either Equation 1 or Equation 2 to find the value of x Using Equation 1:$x + 22(50) = 1380$ $x + 1100 = 1380$ $x = 1380 - 1100$ $x = 280$ The fixed charges (x) are Rs. 280. Or Let the two-digit number be represented as 10x+y, The product of the digits is 18: xy=18 When 63 is subtracted from the number, the digits interchange their places: 10x+y−63=10y+x 10x−x+y−10y=63 9x−9y=63 x−y=7(Equation 1) Now we have two equations: 1. xy=18 (Equation 2) 2. x−y=7 (Equation 1) From Equation 1, x=y+7	½ ½ 1 1 Or 1

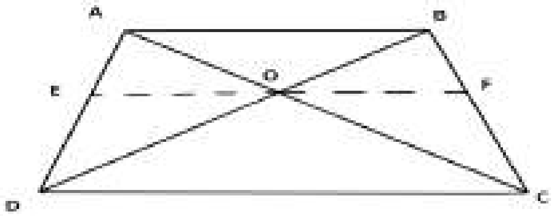
	From Equation 2: (y+7)y=18 $y^2+7y-18=0$ $y^2+7y-18=0$ $y^2+(9-2)y-18=0$ $y^2+9y-2y-18=0$ y(y+9)- 2(y+9)=0 (y+9)(y−2)=0 either y+9=0 → y=−9 (not valid since y must be a digit) or y−2=0 → y=2 Substituting y=2 back into x=y+7: x=2+7=9 Thus, the two-digit number is: 10x+y=10(9)+2=90+2=92	2
29.	sin θ = 1/ 2 , sin θ = sin 30° ⇒ θ = 30° L.H.S = $3\cos\theta - 4\cos^3\theta$ = $3\cos 30° - 4\cos^3(30°)$ = 3 x √3 /2 – $4(\sqrt{3}/2)^3$ = 3√3 / 2 – 4(3√3/ 8) = 3√3 / 2 − 3√3 / 2 = 0 = RHS	½ ½ 1 1
30.	 ABCD is a ॥ gm AP = AS , BP = BQ , CR = CQ , DR = DS [By theorem] By adding the above we get AB + DC = AD + BC ⇒2 AB=2 BC ⇒AB=BC Therefore , ABCD is a rhombus. Area of rhombus = 1 / 2 X *product of diagonals* = 1 / 2 X 2.5 X 3.2	1 1 1

	$=4\ sq\ km$.	
31.	Total number of balls = 19 (i) Prime numbers from 1 to 19 are 2, 3, 5, 7, 11, 13, 17, 19 = Total 8 prime numbers ∴ Probability of drawing a prime number = 8 /19 (ii) Numbers divisible by 3 or 5 are 3, 6, 9, 15, 18, 10, 5, 12 = Total 8 numbers ∴ Probability of drawing a number divisible by 3 or 5 = 8 / 19 (iii) Number divisible by 5 and 10 are 5, 10, 15 = Total 3 ∴ Numbers which are neither divisible by 5 nor 10 are 19 – 3 = 16 ∴ Probability of drawing a number which is neither divisible by 5 nor by 10 = 16 /19	1 1 1
SECTION D		
Section D consists of 4 questions of 5 marks each.		
32.	Let Side of 1st square = x cm Then side of 2nd square = x + 4 cm Area of 1st = x^2 Area of 2nd = $(x+4)^2$ $x^2 + (x+4)^2 = 400$ $x^2 + x^2 + 16 + 8x = 400$ $2x^2 + 8x - 384 = 0$ $x^2 + 4x - 192 = 0$ $x^2 + 16x - 12x - 192 = 0$ $x(x+16) – 12(x+16) =0$ $(x+16)(x-12) = 0$ X= -16, 12 so x = 12 as it can not be negative dimensions of 1st square = 12 cm each side dimension of 2nd square = 12+4 = 16 cm each side	1 1 1 1 1
33.	(i) 	

According to the basic proportionality theorem as stated above, we need to prove:
AP/PB = AQ/QC
Construction
Join the vertex B of ΔABC to Q and the vertex C to P to form the lines BQ and CP and then drop a perpendicular QN to the side AB and also draw PM⊥AC as shown in the given figure.
Proof
Now the area of ∆APQ = 1/2 × AP × QN (Since, area of a triangle= 1/2× Base × Height)
Similarly, area of ∆PBQ= 1/2 × PB × QN
area of ∆APQ = 1/2 × AQ × PM
Also,area of ∆QCP = 1/2 × QC × PM ………… (1)
Now, if we find the ratio of the area of triangles ∆APQand ∆PBQ, we have
(area of ∆APQ / ∆PBQ =(1/2 x AP x QN) / (½ x PB x QN) = AP/PB
Similarly,
(area of ∆APQ / ∆QCP =(1/2 x AQ x PM) / (½ x QC x PM) = AQ/QC …………. (2)

According to the property of triangles, the triangles drawn between the same parallel lines and on the same base have equal areas.
Therefore, we can say that ∆PBQ and QCP have the same area.
area of ∆PBQ = area of ∆QCP …………..(3)
Therefore, from the equations (1), (2) and (3) we can say that,
AP/PB = AQ/QC 3

(ii)



In trapezium ABCD with AB//DC , drawing a line EF//CD
Now according to Basic Proportionality Theorem which states that "If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio".
Now in ,ΔADC
Since EO//CD (from construction)

AE/ED =AO/OC(By Basic Proportionality Theorem) (i)
Also in ΔADB
AE/ED=BO/OD(By Basic Proportionality Theorem) (ii)
Now comparing equations (i) and (ii)
AO/OC=BO/OD
AO/BO=CO/OD (cross multiplying)
Hence proved.

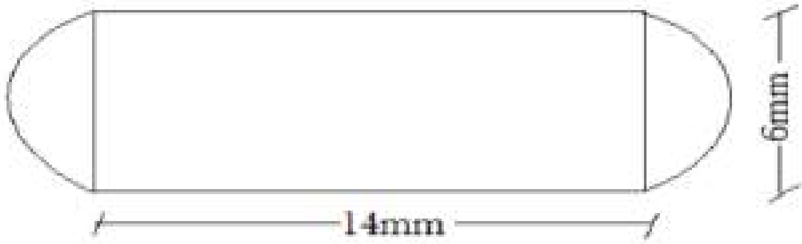
2

34. Given, in trapezium ABCD,AB=18Cm, CD=32 cm
AB//CD and distance between parallel lines = 14 cm
and the radius of each sector =7 cm.
Area of trapezium ABCD= ½ (18+32)X14 = ½ X 50 X 14 = 350 CM^2
Let,∟A=θ1, and ∟B= θ2, ∟C= θ3, ∟D= θ4 2
area of sector A= (θ1 / 360) πr^2
= (θ1/360)X (22/7) X 7X7= (θ1/360)X154
area of sector B= (θ2/360)X154
area of sector C= (θ3/360)X154
area of sector D= (θ4/360)X154 1
Area of 4 sectors={(θ1+ θ2+ θ3+ θ4)/360}x154
= (360 / 360) X 154 = 154Cm^2
Area of shaded region = area of trapezium - area of 4 sectors = 1
350 - 154 = 196Cm^2

1

Or

OR



The capsule is composed of a cylinder and two hemispheres.
The given dimensions are:

- Total length of the capsule = 14 mm
- Diameter of the capsule = 6 mm

From these dimensions, we can determine the radius and the height of the cylindrical part.

- Radius (r) of the capsule =
$$\frac{6\text{mm}}{2} = 3\text{mm}$$ 1
- Height (h) of the cylindrical part = Total length - (radius of one hemisphere + radius of the other hemisphere)
- $h = 14\text{mm} - (3\text{mm} + 3\text{mm}) = 14\text{mm} - 6\text{mm} = 8\text{mm}$
- Surface area of the capsule = Curved surface area of cylinder + Surface area of sphere 1
-
$$A = 2\pi rh + 4\pi r^2$$
$$A = 2\pi(3)(8) + 4\pi(3)^2$$

$$A = 48\pi + 36\pi$$

$$A = 84\pi\text{mm}^2$$

$$A = 84 \times \left(\frac{22}{7}\right) = 264\text{mm}^2$$

1 ½

Volume of the capsule = Volume of cylinder + Volume of sphere

$$V = \pi r^2 h + \frac{4}{3}\pi r^3$$

$$V = \pi(3)^2(8) + \frac{4}{3}\pi(3)^3$$

$$V = 72\pi + \frac{4}{3}\pi(27)$$

$$V = 72\pi + 36\pi$$

$$V = 108\pi\text{mm}^3$$

$$V = 108 \times \left(\frac{22}{7}\right) = 339.43\text{mm}^3$$

1 ½

Answer:
The surface area of the capsule is approximately

$263.76\text{mm}^2(\pi = 3.14)$ / $264\text{mm}^2(\pi = \frac{22}{7})$

and its volume is approximately

$339.12\text{mm}^3(\pi = 3.14)$ / $339.43\text{mm}^3(\pi = \frac{22}{7})$

35.

Class	frequency	cf
0-5	4	4
5-10	6	10
10-15	10	20
15-20	f1	20+f1
20-25	25	45+f1
25-30	f2	45+f1+f2
30-35	18	63+f1+f2
35-40	5	68+f1+f2

1

Median = 24 (Given) ,
So, median class = 20 –25
l = 20. h = 5, n/2 = 50, cf = 20 + f1, f = 25 , We know, Median = l + [{(n/2 -cf)/f} x h] 1
⇒24=20+[{50-(20+f1)}/25]X 5 1
⇒4=(30-f1)/5
⇒30-f1=20
⇒f1=10
Also, sum of frequencies = 100 ⇒ 68 + f1 + f2 = 100 ⇒ f1 + f2 = 32 2
⇒ 10 + f2 = 32 ⇒ f2 = 22
∴ f1 = 10, f2 = 22.

Or

OR

$$Mode = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

1

	From the table and the modal class (45-60), we can identify the following values: (lower limit of the modal class) = 45 (class size) =h= 60 - 45 = 15 $f1$(frequency of the modal class) = 15 $f0$(frequency of the preceding class) = a $f2$(frequency of the succeeding class) = 10 Substitute these values and the given mode (55) into the formula: $55 = 45 + \left(\frac{15-a}{2(15)-a-10}\right) \times 15$ $10 = \left(\frac{15-a}{30-a-10}\right) \times 15$ $10 = \left(\frac{15-a}{20-a}\right) \times 15$ $\frac{10}{15} = \frac{15-a}{20-a}$ $\frac{2}{3} = \frac{15-a}{20-a}$ $2(20-a) = 3(15-a)$ $40 - 2a = 45 - 3a$ $3a - 2a = 45 - 40$ $a = 5$ Sum of frequencies = $6 + 7 + a + 15 + 10 + b = 51$ 6+7+a+15+10+b=51 $6 + 7 + 5 + 15 + 10 + b = 51$(putting the value of a) 6+7+5+15+10+b = 51 43+b=51 b=51−43 b=8 Answer: The missing frequencies are a = 5 and b = 8	1 1 1 1
	SECTION E	
	Case study based questions	
36.	i) For the 6th year:a+5d=16,000 For the 9th year: a+8d=22,600 (a+8d)−(a+5d)=22,600−16,000 This simplifies to 3d=6,600 Therefore, d=2,200 Substitute the value of d back into the first equation: a+5(2,200)=16,000 a+11,000=16,000 a=16,000−11,000 a=5,000 ii) a8 = a + 7d = 5000 + 7×2200 => 5000 + 15400 => 20400 therefore 8th year production = 20400 units iii) S3= 3/2{2x a + (3-1) x d} =3/2(2x 5000 +2 x 2200) = 3/2(10000+4400)	1+1+2

	= 3/2x 14400 = 21600 Or iii) an= a+(n-1)d 29200=5000+(n-1)2200 24200/2200 =n-1 11=n-1 12=n N=12 years	
37.	i) (4, 7) ii) (-6, 7) iii) L (4,7) , N(12,3) $x= \{(4+12)/2\}= 8$ $y=\{(7+3)/2\}= 5$ so mid points are (8,5) OR iii) distance between L(4,7) and O(5,2) is $\sqrt{\{(4-5)^2+(7-2)^2\}}=\sqrt{(1+25)}= \sqrt{26}$ units	1+1+2
38.	(i) In ΔAPB, $\tan 30° = AB/AP \Rightarrow 1/\sqrt{3} = AB/24 \Rightarrow AB = 24/\sqrt{3}$ m = 13.85 m = 14 m (approx) OR Considering, the diagram in the above question, AC as the new height of the shop including the sign-board. In ΔAPC, $\tan 45° = AC/AP \Rightarrow 1 = AC/24 \Rightarrow AC = 24$ m (ii) From Q (i) and Q (ii). Length of sign board, BC = AC – AB = 24 – 14 = 10 m (iii) In ΔAPC, $\cos 45° = AP/PC \Rightarrow 1/\sqrt{2} = 24/PC \Rightarrow PC = 24\sqrt{2}$	2+1+1