MATHEMATICS
SAMPLE QUESTION PAPER
CLASS IX
(SUMMATIVE ASSESSMENT - II)

TIME : 3 hours - 3½ hours **Maximum Marks : 80**

General Instructions :

1. All questions are compulsory.

2. The question paper consists of 34 questions divided into 4 sections, section A, B, C, and D.

3. Section A contains 12 multiple choice type questions, first 8 of which carry 1 mark each and the next 4 carry two marks each. Section B contains 7 questions of 2 marks each, section C contains 10 questions of 3 marks each and section D contains 5 questions of 4 marks each.

4. Use of calculators is not permitted.

SECTION-A

Question numbers 1 to 8 are of 1 marks each and from 9 to 12 are of 2 marks each. Each question is provided with 4 choices out of which only one is correct. Choose the correct one.

Q 1. Between two rational numbers, there is / are

(A) infinite number of rational numbers

(B) one and only one rational number

(C) no rational number

(D) no irrational number

Q2. Which of the following is a polynomial in one variable?

(A) $\sqrt{2} - x^2+3x$ (B) $\sqrt{2x}+9$

(C) x^2+x^{-2} (D) $x^5 + y^8 + 9$

Q3. In Fig. 1, the value of x is

(A) 80° (B) 20°

(C) 40° (D) 60°

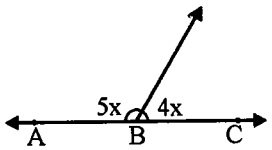


Fig. 1

Q4. In Fig. 2, the congruence rule used in proving $\Delta ACB \cong \Delta ADB$ is

(A) ASA (B) SAS

(C) SSS (D) RHS

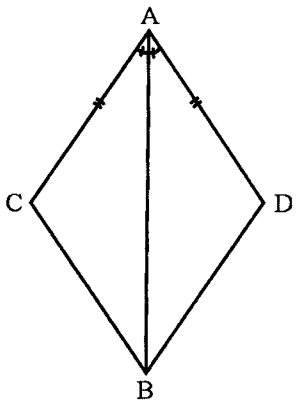


Fig. 2

Q5. The sides of a quadrilateral are extended in order to form exterior angles. The sum of these exterior angles is

(A) 180° (B) 270°

(C) 90° (D) 360°

Q6. ABCD is a rhombus with $\angle ABC=40°$. The measure of $\angle ACD$ is

(A) 90° (B) 20°

(C) 40° (D) 70°

Q7. The distance of a chord of length 16cm from the centre of the circle of radius 10cm is

(A) 6cm (B) 8cm

(C) 10cm (D) 12cm

Q8. If the diameter of base of a cone is 8cm and its height is 3cm, the slant height of cone is

(A) 5 cm (B) 6 cm

(C) 7.5 cm (D) 6.25 cm

Q9. $\frac{1}{\sqrt{18}-\sqrt{32}}$ is equal to

(A) $\sqrt{2}$ (B) $-\sqrt{2}$

(C) $\frac{1}{\sqrt{2}}$ (D) $\frac{-1}{\sqrt{2}}$

Q10. The value of $p\left(\frac{1}{2}\right)$ for $p(z) = z^4 - z^2+z$ is

(A) $\frac{7}{16}$ (B) $\frac{5}{16}$

(C) $\frac{3}{16}$ (D) $\frac{1}{16}$

Q11. In Fig. 3, if AB||CF, CD||FE, then the value of x is

(A) 40°

(B) 65°

(C) 75°

(D) 105°

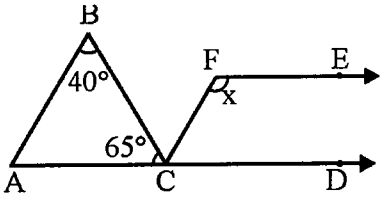


Fig. 3

Q12. In Fig. 4, BCPQ and BCDA are two parallelograms on the same base BC.

The value of (x+y) is

(A) 130°

(B) 140°

(C) 115°

(D) 120°

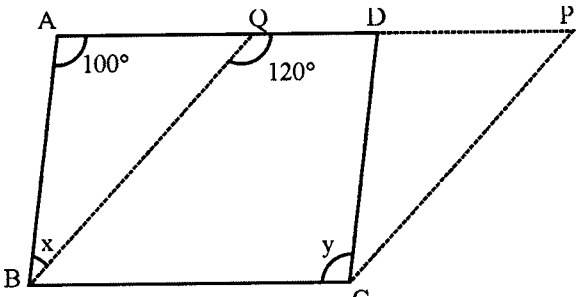


Fig. 4

SECTION-B

Question numbers 13 to 19 carry 2 marks each.

Q13. Without actually calculating the cubes, find the value of $55^3-25^3-30^3$

Q.14. In Fig. 5, OA ⊥ OD, OC ⊥ OB,

OD=OA and OC=OB

Prove that AB=CD

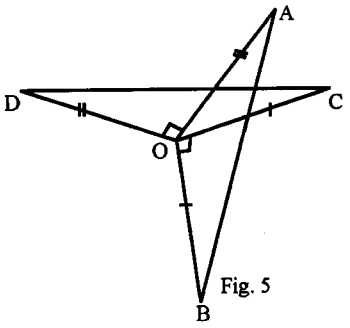


Fig. 5

Q15. In Fig. 6, ABCD is a parallelogram in which X and Y are the mid-points of the sides DC and AB respectively.

Prove that AXCY is a parallelogram.

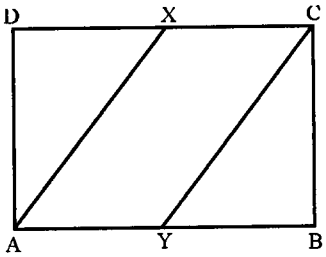


Fig. 6

Q16. In Fig.7, RS is a diameter of the circle with centre O.

NM is parallel to RS and

∠MRS=29°. Find ∠RNM.

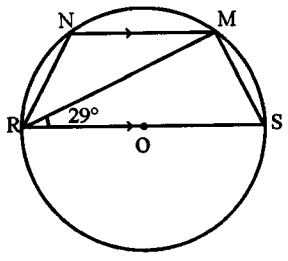


Fig. 7

Q17. The total surface area of a cube is 486cm². Find its volume.

Q18. The mean of 100 observations is 50. If the observation 50 is replaced by 150, what will be the resulting mean?

Q.19. The median of the following observations arranged in ascending order is 24. Find the value of x.

11, 12, 14, 18, x+2, x+4, 30, 32, 35, 41

SECTION C

Question numbers 20 to 29 carry 3 marks each.

Q20. If $a=1-\sqrt{2}$, find the value of $\left(a-\frac{1}{2}\right)^3$

Q21. Factorise $3-12(a-b)^2$

Q22. In Fig.8, AB||CD. Find x.

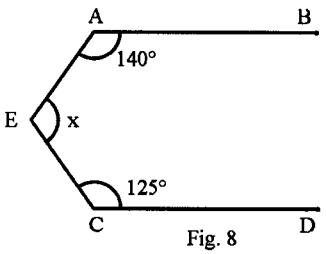


Fig. 8

Q23. In Fig.9, ABCD is a square. M is the mid-point of AB and PQ ⊥ CM meets AD at P and CB produced at Q.

Prove that

(i) $\Delta PAM \cong \Delta QBM$

(ii) CP=CQ

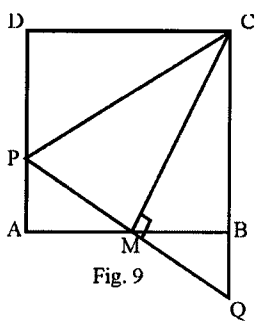


Fig. 9

Q24. In Fig.10, ABCD is a parallelogram in which E is the mid-point of AD. DF||EB, meeting AB produced in F and BC at L. Prove that DF=2DL

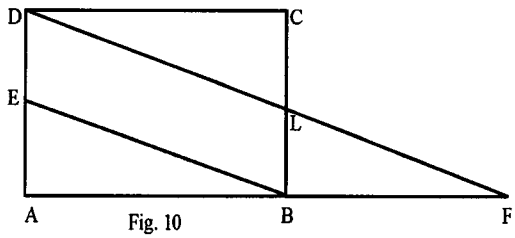


Fig. 10

Q25. In Fig. 11, there are two concentric circles with centre O. AD is a chord of larger cricle intersecting the smaller circle at B and C. Prove that AB=CD.

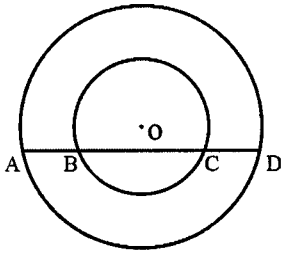


Fig. 11

Q26. In Fig. 12, C and D are two points on the semicircle described on AB as diameter.

If $\angle BAD=70°$ and $\angle DBC=30°$, find $\angle BCD$ and $\angle BDC$.

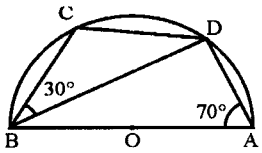


Fig. 12

Q27. The difference between the outside and inside surfaces of a cylindrical pipe 14cm in length is $44cm^2$. Find the thickness of the pipe.

Q28. A sphere, a cylinder and a cone have the same radii. The height of the cylinder and the cone is equal to the diameter of the sphere. Find ratio of their respective volumes.

Q29. The distribution of expenditure of a family on food items is given in the following bar chart. Read the bar chart and answer the following questions:

Q1. What is the percentage of excess expenditure on wheat than that on pulses?

Q2. What is the total percentage expenditure on pulses and ghee?

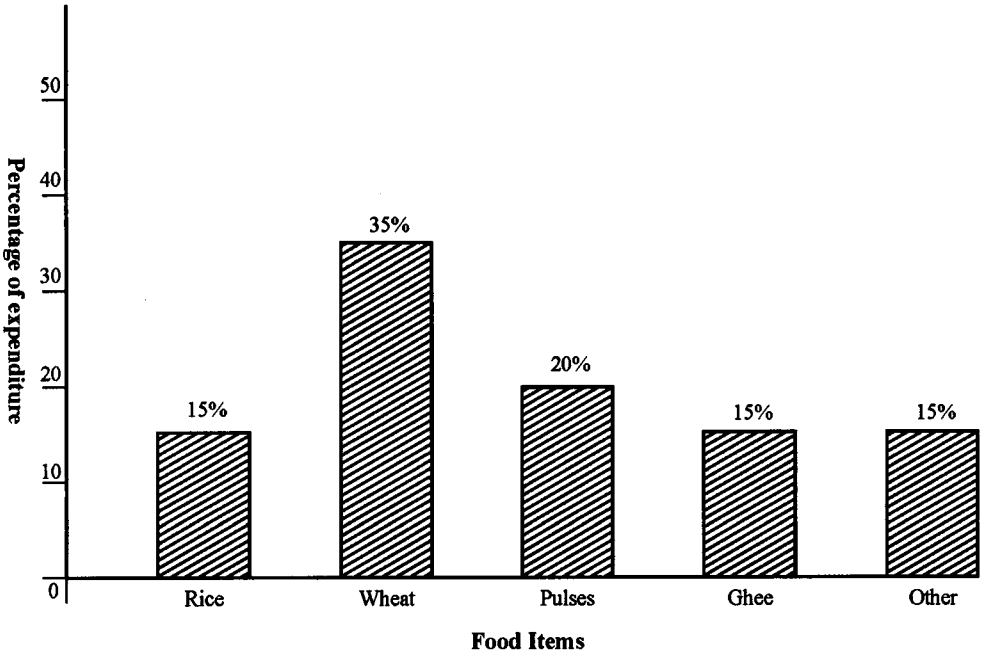


Fig. 13

Section D

Question numbers 30 to 34 carry 4 marks each.

30. Prove that a diagonal of a parallelogram divides it into two congruent triangles.

31. Following table gives the distribution of the marks obtained by the students of a class.

Marks	0-15	15-30	30-45	45-60	60-75	75-90
Number of students	5	12	28	30	35	13

Represent the data by a frequency polygon.

32. Factorise $(a^2-2a)^2 - 23(a^2-2a) + 120$

33. In Fig 14, two circles with centres at A and B intersect each other at points P and Q. Prove that the line joining the centres (AB) bisects the common chord (PQ) at right angles.

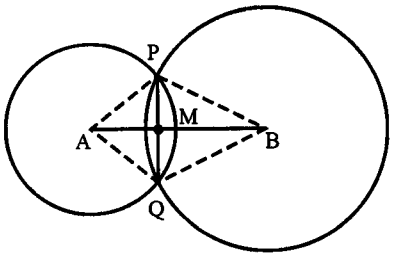


Fig. 14

34. The radius and height of a cylinder are in the ration 2:3. If the volume of the cylinder is 1617 cm^3, find the radius of base of the cylinder.

MATHEMATICS

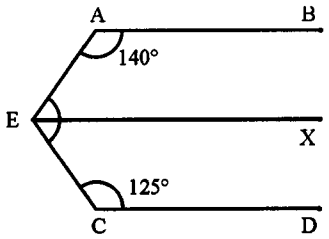
MARKING SCHEME

CLASS IX

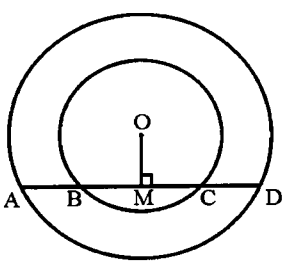
No.	Answers	Marks
	SECTION-A	
1.	**(A)** **2.** **(A)** **3.** **(B)** **4.** **(B)**	
5.	**(D)** **6.** **(D)** **7.** **(A)** **8.** **(A)**	
9.	**(D)** **10.** **(B)** **11.** **(D)** **12.** **(D)**	
	SECTION-B	
13.	$a = 55, \quad b = -25, \quad c = -30$	½
	$\therefore a+b+c=0$	
	If $a+b+c=0$, then $a^3+b^3+c^3=3abc$	½
	$\therefore 55^3-25^3-30^3 = 3(55)(-25)(-30)$	½
	$= 123750$	½
14.	In the given figure	
	$\angle DOA+\angle COA = \angle BOC+\angle COA$	
	$\angle DOC = \angle AOB$	½
	In ΔCOD and ΔBOA	
	$CO = BO$ (given)	
	$OD = OA$ (given)	½
	$\angle DOC = \angle AOB$ (proved above)	
	$\therefore \Delta COD \cong \Delta BOA$ (S.A.S. axiom)	½
	$\therefore$ CD = AB (c.p.c.t.)	½
15.	In the given figure	
	ΔBCD is a parallelogram	
	$\therefore$ AB||CD and AB = CD	½

No.	Answers	Marks
	$\Rightarrow \frac{1}{2}AB \| \| \frac{1}{2}CD$ and $\frac{1}{2}AB = \frac{1}{2}CD$	½
	$\Rightarrow$ XC||AY and XC=AY ($\because$ X and Y are mid point of DC and AB respectively)	½
	$\Rightarrow$ AXCY is a parallelogram.	½
16.	In the given figure	
	$\angle RMS = 90°$ (angle in a semicircle as RS is diameter)	½
	$\therefore \angle RSM = 180° - (29°+90°)$ (angle sum property of triangle)	
	$= 180° - 119°$	
	$= 61°$	1
	$\angle RNM = 180° - 61°$ (opposite angles of a cyclic quadrilateral are supplementary)	
	$= 119°$	½
17.	Let each side of cube be a cm.	
	It is given that $6a^2 = 486$	½
	$\therefore a^2 = 81$	
	$a = 9$ cm	½
	$\therefore$ volume of cube $= a^3$	½
	$= 9^3$	
	$= 729\ cm^3$	½
18.	Mean $= \frac{\text{Sum of 100 observations}}{100}$	½
	Sum of 100 observations $= 50 \times 100$	
	$= 5000$	½
	New sum $= 5000-50+150$	½
	$= 5100$	
	$\therefore$ New mean $= \frac{5100}{100} = 51$	½

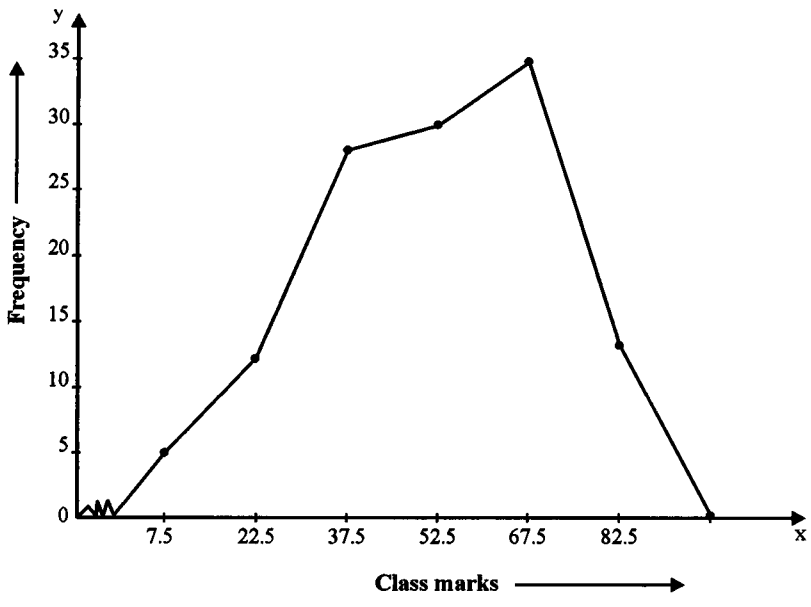
No.	Answers	Marks
19.	Total observations n = 10 (even)	
	$\therefore$ median = mean of $\left(\frac{n}{2}\right)^{th}$ and $\left(\frac{n}{2}+1\right)^{th}$ observations	½
	median = mean of 5th & 6th observations	½
	$24 = \frac{(x+2)+(x+4)}{2}$	
	$= \frac{2x+6}{2} = x+3$	½
	$\therefore$ x = 21	½
	SECTION-C	
20.	$a = 1-\sqrt{2}$	
	$\frac{1}{a} = \frac{1}{1-\sqrt{2}}$	
	$= \frac{1}{1-\sqrt{2}} \times \frac{1+\sqrt{2}}{1+\sqrt{2}}$	½
	$= \frac{1+\sqrt{2}}{1-2}$	½
	$= -\left(1+\sqrt{2}\right)$	½
	$a-\frac{1}{a} = \left(1-\sqrt{2}\right)-\left\{-\left(1+\sqrt{2}\right)\right\}$	½
	$= 1-\sqrt{2}+1+\sqrt{2}$	
	$= 2$	½
	$\therefore \left(a-\frac{1}{a}\right)^3 = 2^3$	
	$= 8$	½

No.	Answers	Marks
21.	$3-12(a-b)^2$	
	$= 3\{1-4(a-b)^2\}$	½
	$= 3\left[(1)^2 - \{2(a-b)\}^2\right]$	1
	$= 3\left[\{1+2(a-b)\}\{1-2(a-b)\}\right]$	1
	$= 3\left[(1+2a-2b)(1-2a+2b)\right]$	½
22.	 Draw EX||CD	
	EX||CD	½
	$\therefore \angle XEC + \angle ECD = 180°$ (interior angles on same side of transversal)	
	$\therefore \angle XEC = 180°-125°$	1
	$= 55°$	
	EX||AB ($\because$ AB||CD)	
	$\therefore \angle XEA + \angle EAB = 180°$ (same reason)	
	$\therefore \angle XEA = 180° - 140°$	
	$= 40°$	1
	$x = \angle XEC + \angle XEA$	
	$= 55° + 40°$	
	$= 95°$	½
23.	In ΔPAM and ΔQBM	
	$\angle PAM = \angle QBM = 90°$ each	
	AM = BM (M is the mid-point of AB)	
	$\angle AMP = \angle BMQ$ (vertically opposite angles)	
	$\therefore \Delta PAM \cong \Delta QBM$ (A.S.A.)	1
	$\therefore$ PM = MQ (c.p.c.t.)	½
	In ΔCPM and ΔCQM	

No.	Answers	Marks
	PM = MQ (proved above)	
	∠PMC = ∠QMC = 90° each	
	CM = CM (common)	
	∴ ΔCPM ≅ ΔCQM (S.A.S. axiom)	1
	∴ CP = CQ (c.p.c.t.)	½
24.	In ΔADF	
	E is the mid-point of AD (given)	
	BE||DF (given)	
	∴ By converse of mid-point therem B is the mid-point of AF	1
	∴ AB = BF (i)	
	ABCD is a parallelogram	
	∴ AB = CD (ii)	
	from (i) and (ii)	
	CD = BF	½
	Consider ΔDLC and ΔFLB	
	DC = FB (proved above)	
	∠DCL = ∠FBL (alternate angles)	
	∠DLC = ∠FLB (vertically opposite angles)	
	∴ ΔDLC ≅ ΔFLB (A.A.S.)	1
	∴ DL = LF	
	∴ DF = 2DL	½
25.	Draw OM ⊥ AB	
	Perpendicular drawn from centre to a chord bisects the chord	½
	∴ AM = MD (i)	½
	OM ⊥ BC, BM = MC (ii)	½
	(i) - (ii) ⇒ AM-BM = MD-MC	½
	⇒ AB = CD	½



No.	Answers	Marks
26.	AB is diameter	
	$\therefore \angle BDA = 90°$ (angle in a semicircle)	
	In ΔBDA	
	$\angle ABD = 180°-(90°+70°)$ (angle sum property of triangle)	
	$= 180° - 160°$	
	$= 20°$	1
	$\angle CBA + \angle ADC = 180°$ (ABCD is a cyclic quadrilateral)	
	$\therefore (30°+20°) + 90° + \angle BDC = 180°$	
	$\therefore \angle BDC = 180° - 140°$	
	$= 40°$	1
	In ΔBCD	
	$\angle BCD = 180° - (30°+40°)$ (angle sum property of triangle)	
	$= 180° - 70°$	
	$= 110°$	1
27.	$2\pi h(r_1 - r_2) = 44$	1
	$2 \times \frac{22}{7} \times 14 (r_1 - r_2) = 44$	1
	$r_1 - r_2 = \frac{1}{2}$	1
	$\therefore$ Thickness of the pipe is $\frac{1}{2}$ cm	
28.	Let radius of sphere = radius of cylinder = radius of cone = r (say)	½
	Height of cylinder = height of cone = 2r	½
	$\therefore$ Vol. of sphere : Vol. of cylinder : Vol of cone	
	$= \frac{4}{3}\pi r^3 : \pi r^2(2r) : \frac{1}{3}\pi(r^2)(2r)$	1
	$= \frac{4}{3} : 2 : \frac{2}{3}$	
	$= 2 : 3 : 1$	1

No.	Answers	Marks
29.	(i) Percentage of excess expenditure on wheat than that on pulses = (35-20)%	1
	= 15%	½
	(ii) Total percentage expenditure on pulses and Ghee = (20+15)%	1
	= 35%	½
	SECTION-D	
30.	Given, To prove, Figure, construction (if any).	2
	Proof	2
31.	Classes / Class - marks / Frequency	
	0-15 / 7.5 / 5	
	15-30 / 22.5 / 12	
	30-45 / 37.5 / 28	
	45-60 / 52.5 / 30	
	60-75 / 67.5 / 35	
	75-90 / 82.5 / 13	2
		2

No.	Answers	Marks
32.	$(a^2-2a)^2 - 23(a^2-2a) + 120$, Let $a^2-2a = x$	½
	$= x^2-23x+120$	½
	$= x^2-8x-15x+120$	½
	$= (x-8)(x-15)$	½
	$= (a^2-2a-8)(a^2-2a-15)$	
	$= (a-4)(a+2)\ (a-5)(a+3)$	2
33.	In ΔAPB and ΔAQB	
	$AP = AQ$ (radii of circle)	
	$PB = QB$ (radii of circle)	
	$AB = AB$ (common)	
	$\therefore \Delta APB \cong \Delta AQB$ (S.S.S.)	1
	$\therefore \angle BAP = \angle BAQ$ (c.p.c.t.)	½
	Consider ΔPMA and ΔQMA	
	$\angle PAM = \angle QAM$	
	$AM = AM$ (common)	
	$AP = AQ$ (radii of circle)	
	$\therefore \Delta PMA \cong \Delta QMA$ (S.A.S. axiom)	1
	$\therefore PM = MQ$	
	$\angle PMA = \angle QMA$ (c.p.c.t.)	½
	Now $\angle PMA + \angle QMA = 180°$ (Linear Pair)	½
	$\therefore 2\angle PMA = 180°$	
	$\angle PMA = 90°$	
	$\therefore PQ \perp AB$	½
34.	$r : h = 2x : 3x$	½
	volume of cylinder $= \pi r^2 h$	½
	$1617 = \frac{22}{7}(2x)^2\ (3x)$	½

No.	Answers	Marks
	$1617 = \frac{22}{7} \times 12x^3$	
	$\Rightarrow x^3 = \frac{539 \times 7}{22 \times 4}$	½
	$= \frac{49 \times 7}{2 \times 4} = \frac{7x7x7}{2x2x2}$	1
	$x = \frac{7}{2}$	½
	$\therefore$ radius of base of the cylinder = 7cm	½