

# **Mathematics**

## **1983 - 2004**

**JAMB**

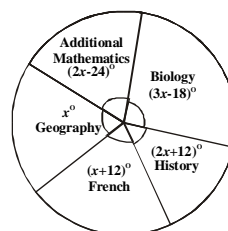
**Questions And Answers**

# Mathematics 1983

1. If M represents the median and D the mode of the measurements 5, 9, 3, 5, 8 then (M,D) is  
 A. (6,5) B. (5,8) C. (5,7)  
 D. (5,5) E. (7,5)
2. A construction company is owned by two partners X and Y and it is agreed that their profit will be divided in the ratio 4:5. at the end of the year. Y received #5,000 more than x. what is the total profit of the company for the year?  
 A. #20,000.00 B. P'0#25,000.00 C. #30,000.00  
 D. #15,000.003 E.#45,000.00
3. Given a regular hexagon, calculate each interior angle of the hexagon.  
 A.  $60^\circ$  B.  $30^\circ$  C.  $120^\circ$   
 D.  $45^\circ$  E.  $135^\circ$
4. Solve the following equations  
 $4x - 3 = 3x + y = 2y + 5x - 12$   
 A.  $4x=5, y=2$  B.  $x=2, y=5$  C.  $x=-2, y=-5$   
 D.  $x=5, y=-2$  E.  $x=-5, y=-2$
5. If  $x = 1$  is root of the equation  $x^3 - 2x^2 - 5x + 6$ , find the other roots  
 A. -3 and 2 B. -2 and 2 C. 3 and -2  
 D. 1 and 3 E. -3 and 1
6. If x is jointly proportional to the cube of y and the fourth power of z. In what ratio is x increased or decreased when y is halved and z is doubled?  
 A. 4:1 increase B. 2:1 increase C. 1:4 decrease  
 D. 1:1 no change E. 3:4 decrease
7. If M represents the median and D the mode of the measurements 5, 9, 3, 5, 8 then (M,D) is  
 A. (6,5) B. (5,8) C. (5,7)  
 D. (5,5) E. (7,5)
10. If  $x + 2$  and  $x - 1$  are factors of the expressions  $lx + 2kx^2 + 24$ , find the values of l and k  
 A.  $l=-6, k=-9$  B.  $l=-2, k=1$  C.  $l=-2, k=-1$   
 D.  $l=0, k=1$  E.  $l=6, k=0$
11. Make T the subject of the equation  

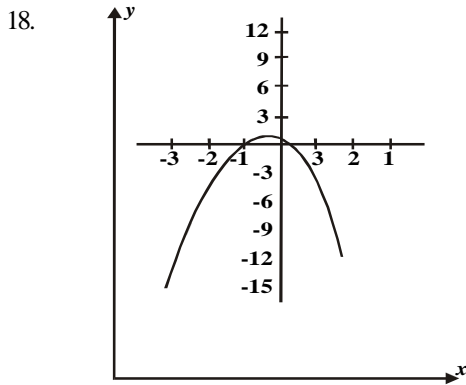
$$\frac{av}{1-v} = \sqrt[3]{\frac{2V+T}{a \cdot 2T}}$$
- A.  $3av/(1-v)$  B.  $2v(1-v)^2 - a^2v^2/2a^2v^2 - (1-v)^2$   
 C.  $2v(1-v)^2 + a^3v^2/2a^2v^2 + (1-v)^2$   
 D.  $2v(1-v)^2 - a^4v^3/2a^3v^3 - (1-v)^3$   
 E.  $2v(1-v)^3 - a^4v^3/2a^3v^3 + (1-v)^3$

12.



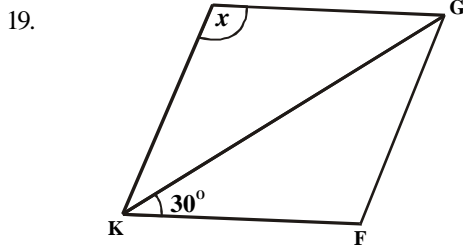
In a class of 60 pupils, the statistical distribution of the number of pupils offering Biology, History, French, Geography and Additional Mathematics is as shown in the pie chart above. How many pupils offer Additional Mathematics?

- A. 15 B. 10 C. 18  
 D. 12 E. 28
13. The value of  $(0.303)^3 - (0.02)^3$  is  
 A. 0.019 B. 0.0019 C. 0.00019  
 D. 0.000019 E. 0.000035
14. y varies partly as the square of x and y partly as the inverse of the square root of x. write down the expression for y if  $y = 2$  when  $x = 1$  and  $y = 6$  when  $x = 4$   
 A.  $y = \frac{10x^2}{31} + \frac{52}{31\sqrt{x}}$  B.  $y = x^2 + \frac{1}{\sqrt{x}}$   
 C.  $y = x^2 + \frac{1}{x}$  D.  $y = \frac{x^2+1}{31 \cdot 31\sqrt{x}}$  E.  $y = \frac{10(x^2+1)}{31(\sqrt{x})}$
15. Simplify  $(x-7)/(x^2-9)(x^2-3x)/(x^2-49)$   
 A.  $x/(x-3)(x+7)$  B.  $(x+3)(x+7)/x$  C.  $x/(x-3)(x-7)$   
 D.  $x/(x+3)(x+7)$  E.  $x/(x+4)(x+7)$
16. The lengths of the sides of a right-angled triangle at  $(3x+1)$ cm,  $(3x-1)$ cm and x cm.  
 A. 2 B. 6 C. 18  
 D. 12 E. 0
17. The scores of a set of a final year students in the first semester examination in a paper are 41,29,55,21,47,70,70,40,43,56,73,23,50,50. find the median of the scores.  
 A. 47 B.  $48\frac{1}{2}$  C. 50  
 D. 48 E. 49
8. Given that  $\cos z = L$ , where z is an acute angle find an expression for  $\frac{\cos z + \tan z}{\sec z + \tan z} - \operatorname{cosec} z$   
 A.  $\frac{1-L}{1+L}$  B.  $\frac{L^2-\sqrt{1-L^2}}{L^2+L-1}$  C.  $\frac{-L-\sqrt{1-L}}{(L+1)+\sqrt{1-L^2}}$   
 D.  $\frac{\sqrt{L-1}}{(L+L^2)+\sqrt{1-L^2}}$  E.  $\frac{L-(L^2-1)}{1+\sqrt{1-L^2}+\sqrt{1-L^2}}$
9. If  $0.0000152x \times 0.00042 = Ax \times 10^8$ , where  $1 \leq A < 10$ , find A and B.  
 A.  $A=9, B=6.38$  B.  $A=6.38, B=-9$  C.  $A=6.38, B=9$   
 D.  $A=6.38, B=-1$  E.  $A=6.38, B=1$



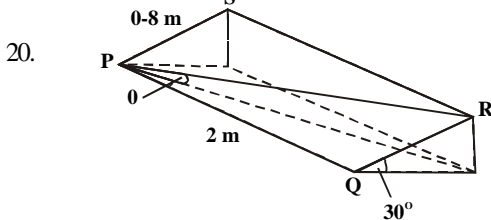
Which of the following equations represents the above graph?

- A.  $y = 1 + 2x + 3x^2$  B.  $y = 1 - 2x + 3x^2$  C.  $y = 1 + 2x - 3x^2$   
 D.  $y = 1 - 2x - 3x^2$  E.  $y = 3x^2 + 2x - 1$



The above figure FGHK is a rhombus. What is the value of the angle x?

- A.  $90^\circ$  B.  $30^\circ$  C.  $150^\circ$   
 D.  $120^\circ$  E.  $60^\circ$



PQRS is a desk of dimensions 2m x 0.8m which is inclined at  $30^\circ$  to the horizontal. Find the inclination of the diagonal PR to the horizontal.

- A.  $23^\circ 35'$  B.  $30^\circ$  C.  $15^\circ 36'$   
 D.  $10^\circ$  E.  $10^\circ 42'$

21. Find x if  $(x_{\text{base } 4})^2 = 100 \ 1000_{\text{base } 2}$   
 A. 6 B. 12 C. 100  
 D. 210 E. 110

22. Simplify  $\log_{10} a^{1/2} + 1/4 \log_{10} a - 1/12 \log_{10} a^7$   
 A. 1 B.  $7/6 \log_{10} a$  C. 0  
 D. 10 E. a

23. If w varies inversely as V and u varies directly as  $w^3$ , find the relationship between u and V given that  $u = 1$ , when  $V = 2$

- A.  $u = 8V^3$  B.  $u = 2\sqrt{V}$  C.  $V = 8/u^2$   
 D.  $V = 8u^2$  E.  $U = 8/v^3$

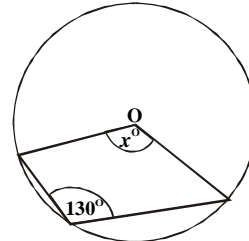
24. Solve the simultaneous equations for x  
 $x^2 + y - 8 = 0$   
 $y + 5x - 2 = 0$

- A. -28,7 B. 6,-28 C. 6,-1  
 D. -1,7 E. 3,2

25. Find the missing value in the following table.

| x                 | -2 | -1 | 0 | 1 | 2 | 3  |
|-------------------|----|----|---|---|---|----|
| $y = x^3 - x + 3$ |    | 3  | 3 | 3 | 9 | 27 |

- A. -3 B. 3 C. -9  
 D. 13 E. 9



If O is the centre of the circle in the figure above. Find the value of x

- A. 50 B. 260 C. 100  
 D. 6 E. 130

27. Find the angle of the sectors representing each item in a pie chart of the following data. 6,10,14,16,26

- A.  $15^\circ, 25^\circ, 35^\circ, 40^\circ, 65^\circ$  B.  $60^\circ, 100^\circ, 140^\circ, 160^\circ, 260^\circ$   
 C.  $6^\circ, 10^\circ, 14^\circ, 16^\circ, 26^\circ$  D.  $30^\circ, 50^\circ, 70^\circ, 80^\circ, 130^\circ$   
 E. None of the above

28. The scores of 16 students in a Mathematics test are 65,65,55,60,60,65,60,70,75,70,65,70,60,65,65,70

What is the sum of the median and modal scores?

- A. 125 B. 130 C. 140  
 D. 150 E. 137.5

29. The letters of the word MATRICULATION are cut and put into a box. One of the letter is drawn at random from the box. Find the probability of drawing a vowel.

- A.  $2/13$  B.  $5/13$  C.  $6/13$   
 D.  $8/13$  E.  $4/13$

30. Correct each of the number 59.81789 and 0.0746829 to three significant figures and multiply them, giving your answer to three significant figures.

- A. 4.46 B. 4.48 C. 4.47  
 D. 4.49 E. 4.50

31. If a rod of length 250cm is measured as 255cm longer in error, what is the percentage error in measurement?

- A. 55 B. 10 C. 5  
 D. 4 E. 2

32. If  $(2/3)m (3/4)n = 256/729$ , find the values of m and n

- A.  $m=4, n=2$  B.  $m=-4, n=-2$  C.  $m=-4, n=2$   
 D.  $m=4, n=-2$  E.  $m=-2, n=4$

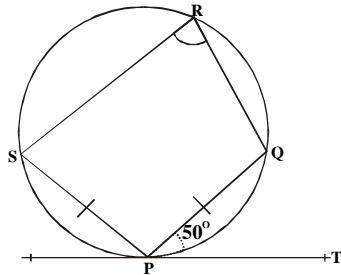
33. Without using tables find the numerical value of  $\log_7 49 + \log_7 (1/7)$

- A. 1 B. 2 C. 3  
 D. 7 E. 0

34. Factorize completely  $81a^4 - 16b^4$
- A.  $(3a + 2b)(2a - 3b)(9a^2 + 4b^2)$   
 B.  $(3a - 2b)(2a - 3b)(4a^2 - 9b^2)$   
 C.  $(3a - 2b)(3a - 2b)(9a^2 + 4b^2)$   
 D.  $(3a - 2b)(2a - 3b)(9a^2 + 4b^2)$   
 E.  $(3a - 2b)(2a - 3b)(9a^2 - 4b^2)$

35. One interior angle of a convex hexagon is  $170^\circ$  and each of the remaining interior angles is equal to  $x^\circ$ . find  $x$
- A.  $120^\circ$  B.  $110^\circ$  C.  $105^\circ$   
 D.  $102^\circ$  E.  $100^\circ$

36. PQRS is a cyclic quadrilateral in which  $PQ = PS$ . PT is a tangent to the circle and PQ makes an angle  $50^\circ$  with the tangent as shown in the figure below. What is the size of  $\angle QRS$ ?



- A.  $50^\circ$  B.  $40^\circ$  C.  $110^\circ$   
 D.  $80^\circ$  E.  $100^\circ$

37. A ship H leaves a port P and sails 30km due South. Then it sails 60km due west. What is the bearing of H from P?
- A.  $26^\circ 34'$  B.  $243^\circ 26'$  C.  $116^\circ 34'$   
 D.  $63^\circ 26'$  E.  $240^\circ$

38. In a sample survey of a university community the following table shows the percentage distribution of the number of members per household.

| No of members per household | 1 | 2  | 3  | 4  | 5  | 6  | 7 | 8 | Total |
|-----------------------------|---|----|----|----|----|----|---|---|-------|
| Number of households        | 3 | 12 | 15 | 28 | 21 | 10 | 7 | 4 | 100   |

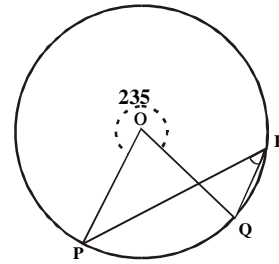
- A. 4 B. 3 C. 5  
 D. 45 E. None

39. On a square paper of length 2.524375cm is inscribed a square diagram of length 0.524375. find the area of the paper not covered by the diagram correct to 3 significant figures.
- A.  $6.00\text{cm}^2$  B.  $6.10\text{cm}^2$  C.  $6\text{cm}^2$   
 D.  $6.09\text{cm}^2$  E.  $4.00\text{cm}^2$

40. If  $f(x) = \frac{1}{x-1} + \frac{x-1}{x^2-1}$  find  $f(1-x)$

- A.  $1/x + 1/(x+2)$  B.  $x + 1/(2x - 1)$   
 C.  $-1/x - 1/(x-2)$  D.  $-1/x + 1/(x^2 - 1)$

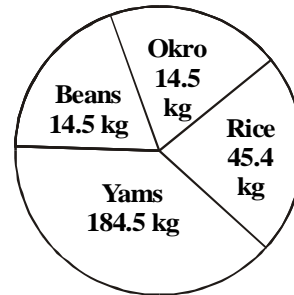
41. In the figure below find  $\angle PRQ$



- A.  $66\frac{1}{2}^\circ$  B.  $62\frac{1}{2}^\circ$  C.  $125^\circ$   
 D.  $105^\circ$  E.  $65^\circ$

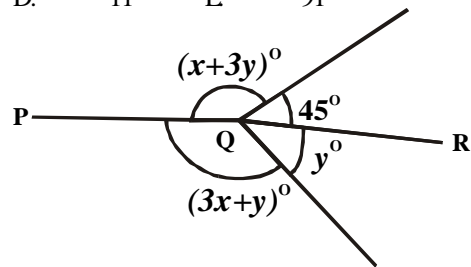
42. Simplify  $\sqrt{27a^9/8}$
- A.  $9a^2/2$  B.  $9a^3/2$  C.  $2/3a^2$   
 D.  $2/3a^2$  E.  $3a^3/2$

- 43.



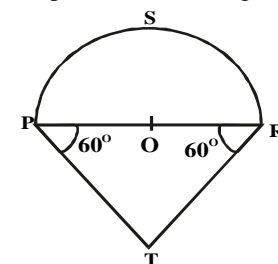
- The farm yields of four crops on a piece of land in Ondo are represented on the pie chart above. What is the angle of the sector occupied by Okro in the chart?
- A.  $91\frac{1}{2}^\circ$  B.  $19\frac{1}{3}^\circ$  C.  $33\frac{1}{3}^\circ$   
 D.  $11^\circ$  E.  $91^\circ$

- 44.



- In the figure above, PQR is a straight line. Find the values of  $x$  and  $y$
- A.  $x = 22.5^\circ$  and  $y = 33.75^\circ$   
 B.  $x = 15^\circ$  and  $y = 52.5^\circ$   
 C.  $x = 22.5^\circ$  and  $y = 45.0^\circ$   
 D.  $x = 56.25^\circ$  and  $y = 11.5^\circ$   
 E.  $x = 18.^\circ$  and  $y = 56.5^\circ$

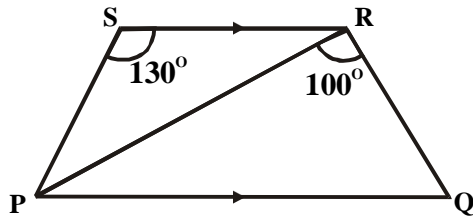
45. PQR is the diameter of a semicircle RSP with centre at Q and radius of length 3.5cmc. if  $\angle QPT = \angle QRT = 60^\circ$ . Find the perimeter of the figure (PTRS  $p = 22/7$ )



- A. 25cm B. 18cm C. 36cm  
 D. 20cm E. 25.5cm

46. In a triangle PQR,  $QR = 3\text{cm}$ ,  $PR = 3\sqrt{3}\text{cm}$ ,  $PQ = 6\text{cm}$  and  $\angle PQR = 30^\circ$ . find angles P and R
- A.  $P = 60^\circ$  and  $R = 90^\circ$   
 B.  $P = 30^\circ$  and  $R = 120^\circ$   
 C.  $P = 90^\circ$  and  $R = 60^\circ$   
 D.  $P = 60^\circ$  and  $R = 60^\circ$   
 E.  $P = 45^\circ$  and  $R = 105^\circ$

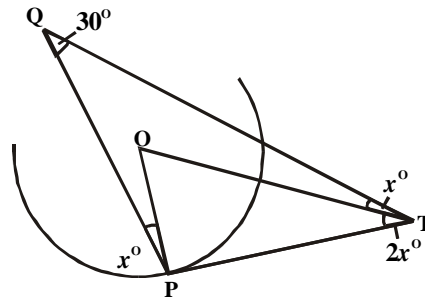
47.



In the above diagram if  $PS = SR$  and  $PQ \parallel SR$ . what is the size of  $\angle PQR$ ?

- A.  $25^\circ$  B.  $50^\circ$  C.  $55^\circ$   
 D.  $65^\circ$  E.  $75^\circ$
48. Find the mean of the following  
 24.57, 25.63, 25.32, 26.01, 25.77
- A. 25.12 B. 25.30 C. 25.26  
 D. 25.50q E. 25.73

49.



In the figure above PT is a tangent to the circle with centre O. if  $\angle PQT = 30^\circ$ . find the value of  $\angle PTO$

- A.  $30^\circ$  B.  $15^\circ$  C.  $24^\circ$   
 D.  $12^\circ$  E.  $60^\circ$

50

A man drove for 4 hours at a certain speed, he then doubled his speed and drove for another 3 hours. Altogether he covered 600km. At what speed did he drive for the last 3 hours?

- A. 120km/hr B. 60km/hr C. 600/7km/hr  
 D. 50km/hr E. 100km/hr.

## Mathematics 1984

1. Simplify  $(\frac{2}{3} - \frac{1}{5}) - \frac{1}{3}$  of  $\frac{2}{5}$   
 A.  $\frac{1}{7}$  B.  $\frac{3 - \frac{1}{1/2}}{7}$  C.  $\frac{1}{3}$   
 D.  $\frac{1}{3}$  E.  $\frac{1}{5}$
2. If  $263 + 441 = 714$ , what number base has been used?  
 A. 12 B. 11 C. 10  
 D. 9 E. 8
3.  $0.00014323 / 1.940000 = k \times 10^n$  where  $1 \leq k < 10$  and n is a whole number. The values of K and n are  
 A. 7.381 and -11 B. 2.34 and 10  
 C. 3.87 and 2 D. 7.831 and -11  
 E. 5.41 and -2
4. P sold his bicycle to Q at a profit of 10%. Q sold it to R for #209 at a loss of 5%. How much did the bicycle cost P?  
 A. #200 B. #196 C. #180  
 D. #205 E. #150
5. If the price of oranges was raised by  $\frac{1}{2}k$  per orange, the number of oranges customer can buy for #2.40 will be less by 16. What is the present price of an orange?  
 A.  $2\frac{1}{2}k$  B.  $3\frac{1}{2}k$  C.  $5\frac{1}{2}k$   
 D.  $20k$  E.  $21\frac{1}{2}k$
6. A man invested a total of #50,000 in two companies. If these companies pay dividend of 6% and 8% respectively, how much did he invest at 8% if the total yield is #3,700?  
 A. #15,000 B. #29,600 C. #21,400  
 D. #27,800 E. #35,000
7. Thirty boys and x girls sat for a test. The mean of the boys' scores and that of the girls were respectively 6 and 8. find x if the total score was 468.  
 A. 38 B. 24 C. 36  
 D. 22 E. 41
8. The cost of production of an article is made up as follows
 

|               |     |
|---------------|-----|
| Labour        | #70 |
| Power         | #15 |
| Materials     | #30 |
| Miscellaneous | #5  |

 Find the angle of the sector representing labour in a pie chart.  
 A.  $210^\circ$  B.  $105^\circ$  C.  $175^\circ$   
 D.  $150^\circ$  E.  $90^\circ$
9. Bola chooses at random a number between 1 and 300. What is the probability that the number is divisible by 4?  
 A.  $\frac{1}{3}$  B.  $\frac{1}{4}$  C.  $\frac{1}{5}$   
 D.  $\frac{4}{300}$  E.  $\frac{1}{300}$

10. Find without using logarithm tables, the value of  $\frac{\log_3 27 - \log_{1/4} 64}{\log_3 1/81}$
- A.  $7/4$  B.  $-7/4$  C.  $-3/2$   
 D.  $7/3$  E.  $-1/4$

11. A variable point P(x, y) traces a graph in a two dimensional plane. (0, -3) is one position of P. If x increases by 1 unit, y increases by 4 units. The equation of the graph is
- A.  $-3 = y + 4/x + 1$  B.  $4y = -3 + x$   
 C.  $y/x = -3/4$  D.  $y + 3 = 4x$   
 E.  $4y = x + 3$

12. A trader in a country where their currency 'MONT' (M) is in base five bought  $103_{(5)}$  oranges at  $M14_{(5)}$  each. If he sold the oranges at  $M24_{(5)}$  each, what will be his gain?
- A.  $M103_{(5)}$  B.  $M1030_{(5)}$  C.  $M102_{(5)}$   
 D.  $M2002_{(5)}$  E.  $M3032_{(5)}$

13. Rationalize  $(5\sqrt{5} - 7\sqrt{5})/(\sqrt{7} - \sqrt{5})$
- A.  $-2\sqrt{35}$  B.  $4\sqrt{7} - 6\sqrt{5}$  C.  $-\sqrt{35}$   
 D.  $4\sqrt{7} - 8\sqrt{5}$  E.  $\sqrt{35}$

14. Simplify  $\frac{3^n - 3^{n-1}}{3^3 \times 3^n - 27 \times 3^{n-1}}$
- A. 1 B. 0 C.  $1/27$   
 D.  $3^n - 3^{n-1}$  E.  $2/27$

15. p varies directly as the square of q and inversely as r. If  $p = 36$ , when  $q = 3$  and  $r = p$ , find p when  $q = 5$  and  $r = 2$
- A. 72 B. 100 C. 90  
 D. 200 E. 125

16. Factorise  $6x^2 - 14x - 12$
- A.  $2(x+3)(3x-2)$  B.  $6(x-2)(x+1)$   
 C.  $2(x-3)(3x+2)$  D.  $6(x+2)(x-1)$   
 E.  $(3x+4)(2x+3)$

17. A straight line  $y = mx$  meets the curve  $y = x^2 - 12x + 40$  in two distinct points. If one of them is (5,5), find the other
- A. (5,6) B. (8,8) C. (8,5)  
 D. (7,7) E. (7,5)

18. The table below is drawn for a graph  $y = x^2 - 3x + 1$

|                    |    |    |    |   |    |   |   |
|--------------------|----|----|----|---|----|---|---|
| x                  | -3 | -2 | -1 | 0 | 1  | 2 | 3 |
| $y = x^2 - 3x + 1$ | 1  | -1 | 3  | 1 | -1 | 3 | 1 |

From  $x = -2$  to  $x = 1$ , the graph crosses the x-axis in the range(s)

- A.  $-1 < x < 0$  and  $0 < x < 1$   
 B.  $-2 < x < -1$  and  $0 < x < 1$   
 C.  $-2 < x < -1$  and  $0 < x < 1$   
 D.  $0 < x < 1$  E.  $1 < x < 2$

19. In a racing competition. Musa covered a distance of 5xkm in the first hour and (x + 10)km in the next hour. He was second to Ngozi who covered a total distance of 118km in the two hours. Which of the following inequalities is correct?
- A.  $0 < -x < 15$  B.  $-3 < x < 3$   
 C.  $15 < x < 18$  D.  $0 < x < 15$   
 E.  $0 < x < 18$

20.  $2x + 3y = 1$  and  $y = x - 2y = 11$ , find (x + y)
- A. 5 B. -3 C. 8  
 D. 2 E. -2

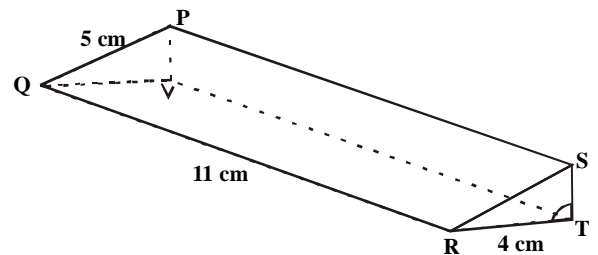
21. Tunde and Shola can do a piece of work in 18days. Tunde can do it alone in x days, whilst Shola takes 15 days longer to do it alone. Which of the following equations is satisfied by x?
- A.  $x^2 - 5x - 18 = 0$  B.  $x^2 - 20x + 360 = 0$   
 C.  $x^2 - 21x - 270 = 0$  D.  $2x^2 + 42x - 190 = 0$   
 E.  $3x^2 - 31x + 150 = 0$

22. If  $fx = 2(x - 3)2 + 3(x - 3) - 4$  and  $g(y) = \sqrt{5} + y$ , find  $g\{f(3)\}$  and  $g\{f(4)\}$
- A. 3 and 4 B. -3 and 4  
 C. -3 and -4 D. 3 and -4  
 E. 0 and  $\sqrt{5}$

23. The quadratic equation whose roots are  $1 + \sqrt{13}$  and  $1 + \sqrt{13}$  is
- A.  $x^2 + (1 - \sqrt{13})x + 1 + \sqrt{13} = 0$   
 B.  $x^2 + (1 - \sqrt{13})x + 1 - \sqrt{13} = 0$   
 C.  $x^2 + 2x + 12 = 0$  D.  $x^2 - 2x + 12 = 0$   
 E.  $x^2 - 2x - 12 = 0$

24. Find a factor which is common to all three binomial expressions  $4a^2 - 9b^2$ ,  $a^3 + 27b^3$ ,  $(4a + 6b)^2$
- A.  $4a + 6b$  B.  $4a - 6b$   
 C.  $2a + 3b$  D.  $2a - 3b$   
 E. none

- 25.

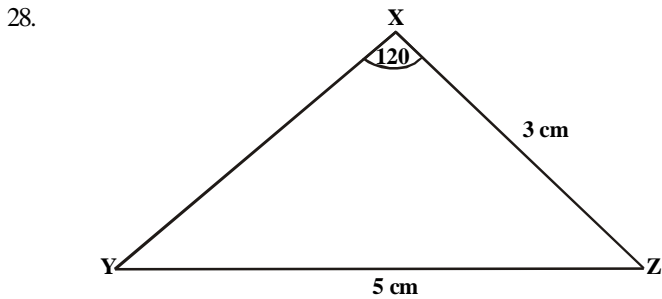


What is the volume of the regular three dimensional figure drawn above?

- A.  $160\text{cm}^3$  B.  $48\text{cm}^3$  C.  $96\text{cm}^3$   
 D.  $120\text{cm}^3$  E.  $40\text{cm}^3$

26. If (x - 2) and (x + 1) are factors of the expression  $x^3 + px^2 + qx + 1$ , what is the sum of p and q?
- A. 0 B. -3 C. 3  
 D.  $-17/3$  E.  $-2/3$

27. A cone is formed by bending a sector of a circle having an angle of  $210^\circ$ . Find the radius of the base of the cone if the diameter of the circle is base of the cone if the diameter of the circle is 12cm
- A. 7.00cm B. 1.75cm C. 0.21cm  
D. 3.50cm E. 2.021cm

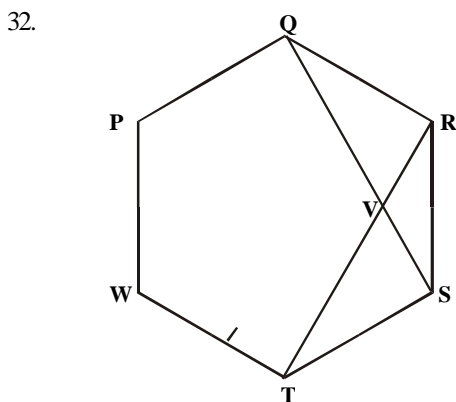


- Using  $\triangle XYZ$  in the figure above find  $\angle XYZ$
- A.  $29^\circ$  B.  $31^\circ 20'$  C.  $31^\circ$   
D.  $31^\circ 18'$  E.  $59^\circ$

29. The sides of a triangle are  $(x+4)$ cm,  $x$  cm and  $(x-4)$  cm respectively. If the cosine of the largest angle is  $1/5$ , find the value of  $x$
- A. 24cm B. 20cm C. 28cm  
D.  $88/7$ cm E. 0cm

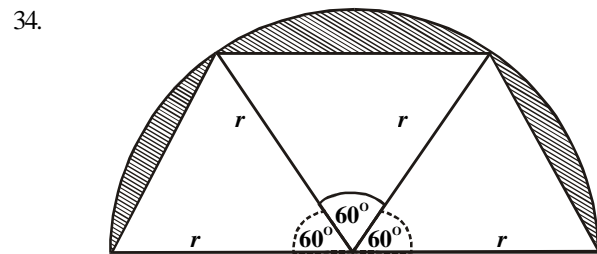
30. If  $a = 2x/1-x$  and  $b = 1+x/1-x$  then  $a^2 - b^2$  in the simplest form is
- A.  $3x+1/(x-1)$  B.  $3x^2-1/(x-1)^2$   
C.  $3x^2+1/(1-x)^2$  D.  $5x^2-1/(1-x)^2$   
E.  $5x^2-2x-1/(1-x)^2$

31. Simplify  $(1 + \frac{x-1}{x+1}) (x+2)$
- A.  $(x^2-1)(x+2)$  B.  $x^2(x+2)/x+1$   
C.  $x^2-(x+2)$  D.  $2x(x+2)$   
E.  $2x(x+2)/x+1$



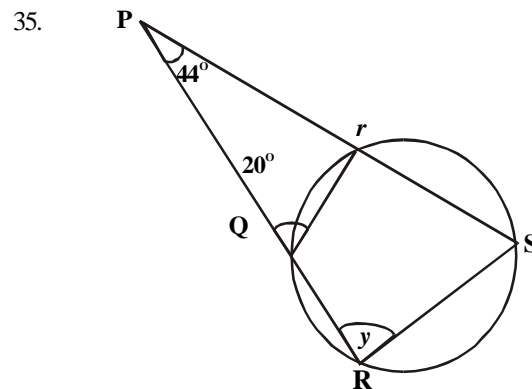
- In the figure above PQRSTW is a regular hexagon. QS intersects RT at V. calculate  $\angle TVS$ .
- A.  $60^\circ$  B.  $90^\circ$  C.  $120^\circ$   
D.  $30^\circ$  E.  $80^\circ$

33. Find the integral values of  $x$  which satisfy the inequalities  $-3 < 2-5x < 12$
- A. -2, -1 B. -2, 2 C. -1, 0  
D. 0, 1 E. 1, 2



Find the area of the shaded portion of the semi-circular figure above.

- A.  $r^2/4(4p-3\sqrt{3})$  B.  $r^2/4(2p+3\sqrt{3})$   
C.  $1/2r^2p$  D.  $1/8r\sqrt{3}$   
E.  $r^2/8(4p+3\sqrt{3})$



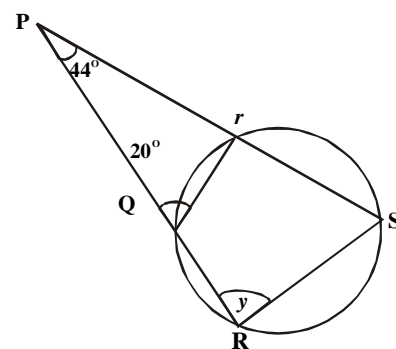
In the figure above QRS is a line,  $\angle PSQ = 35^\circ$   $\angle SPR = 30^\circ$  and O is the centre of the circle find  $\angle QOP$

- A.  $35^\circ$  B.  $30^\circ$  C.  $130^\circ$   
D.  $25^\circ$  E.  $65^\circ$
36. If  $pq + 1 = q^2$  and  $t = 1/p - 1/pq$  express  $t$  in terms of  $q$
- A.  $1/p - q$  B.  $1/q - 1$   
C.  $1/q + 1$  D.  $1 + q$   
E.  $1/1 - q$

37. The cumulative frequency function of the data below is given by the frequency  $y = cf(x)$ . what is  $cf(5)$ ?

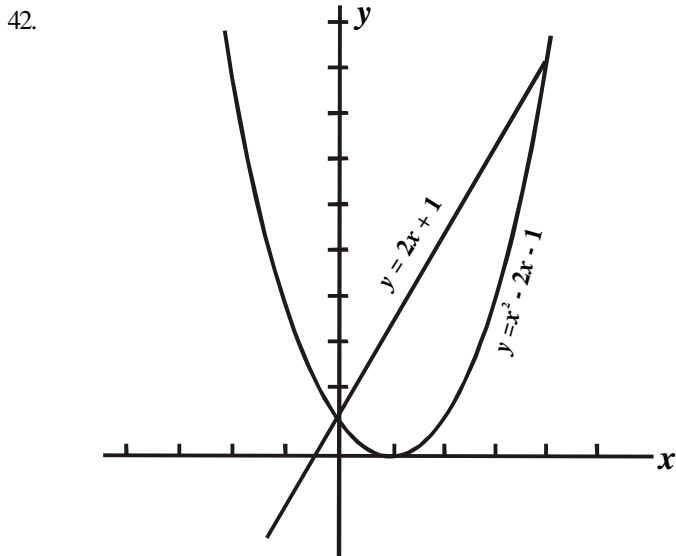
| Scores(n) | Frequency(f) |
|-----------|--------------|
| 3         | 30           |
| 4         | 32           |
| 5         | 30           |
| 6         | 35           |
| 7         | 20           |

- A. 30 B. 35 C. 55  
D. 62 E. 92
38. In the figure determine the angle marked  $y$
- A.  $66^\circ$  B.  $110^\circ$  C.  $26^\circ$   
D.  $70^\circ$  E.  $44^\circ$



39. A right circular cone has a base radius  $r$  cm and a vertical height  $2y^0$ . the height of the cone is
- A.  $r \tan y^0$  cm      B.  $r \sin y^0$  cm  
 C.  $r \cot y^0$  cm      D.  $r \cos y^0$  cm  
 E.  $r \operatorname{cosec} y^0$  cm
40. Two fair dice are rolled. What is the probability that both show up the same number of point?
- A.  $1/36$       B.  $7/36$       C.  $1/2$   
 D.  $1/3$       E.  $1/6$

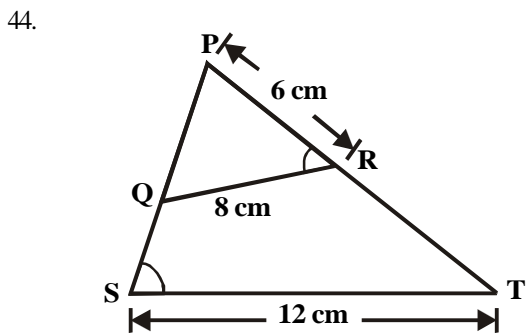
41. The larger value of  $y$  for which  $(y - 1)^2 = 4y - 7$  is
- A. 2      B. 4      C. 6  
 D. 7      E. 8



Find the  $x$  coordinates of the points of intersection of the two equations in the graph above.

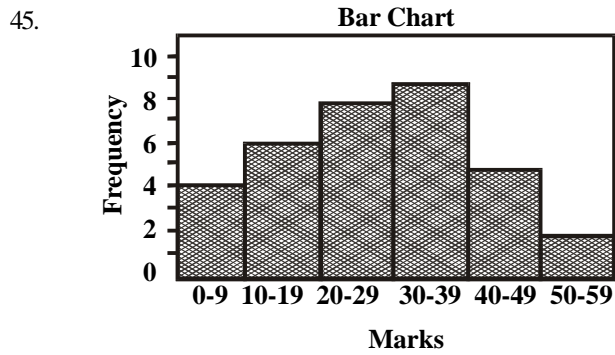
A. 1,1      B. 0,4      C. 4,9  
 D. 0,0      E. 0,4

43. If  $\sin q = x/y$  and  $0^\circ < q < 90^\circ$  then find  $1/\tan q$
- A.  $x/\sqrt{(y^2 - x^2)}$       B.  $x/y$   
 C.  $\frac{\sqrt{y^2 - x^2}}{\sqrt{y^2 - x^2}}$       D.  $(\sqrt{y^2 - x^2})/(\sqrt{y^2 - x^2})$   
 E.  $\sqrt{y^2 - x^2/y}$



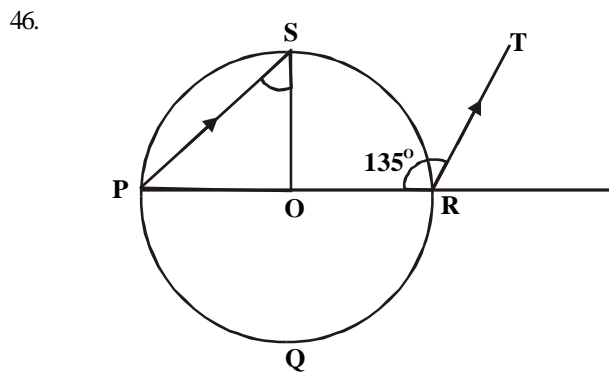
In the figure above  $TSP = PRQ$ ,  $QR = 8$  cm.  $PR = 6$  cm and  $ST = 12$  cm. Find the length  $SP$

A. 4 cm      B. 16 cm      C. 9 cm  
 D. 14 cm      E. Impossible insufficient data



The bar chart above shows the mark distribution in a class test. Find the number of students in the class.

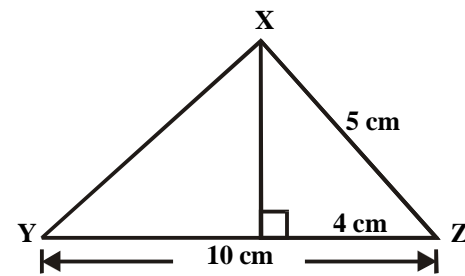
A. 9      B. 2      C. 60  
 D. 30      E. 34



In the figure above,  $O$  is the centre of circle  $PQRS$  and  $PS \parallel RT$ . If  $\angle PRT = 135^\circ$ , then  $\angle PSQ$  is

A.  $67\frac{1}{2}^\circ$       B.  $45^\circ$       C.  $90^\circ$   
 D.  $33\frac{3}{4}^\circ$       E.  $22\frac{1}{2}^\circ$

47.  $XYZ$  is a triangle and  $XW$  is perpendicular to  $YZ$  at  $W$ . if  $XZ = 5$  cm and  $WZ = 4$  cm, calculate  $XY$ .
- A.  $5\sqrt{3}$  cm      B.  $3\sqrt{5}$  cm      C.  $3\sqrt{3}$  cm  
 D. 5 cm      E. 6 cm



48. Measurements of the diameters in centimeters of 20 copper spheres are distributed as shown below

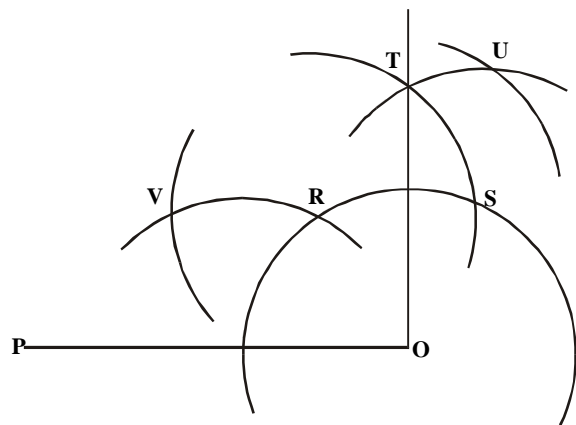
| Class boundary in cm | frequency |
|----------------------|-----------|
| 3.35-3.45            | 3         |
| 3.45-3.55            | 6         |
| 3.55-3.65            | 7         |
| 3.65-3.75            | 4         |

What is the mean diameter of the copper sphere?

A. 3.40 cm      B. 3.58 cm      C. 3.56 cm  
 D. 3.62 cm      E. 3.63 cm



Use the instruction below to answer question 49 and 50



49. What is the obtuse angle formed when the point U is joined to Q?  
 A.  $75^\circ$  B.  $154^\circ$  C.  $120^\circ$   
 D.  $105^\circ$  E.  $125^\circ$
50. What is the acute angle formed when the point V joined to Q?  
 A.  $60^\circ$  B.  $30^\circ$  C.  $45^\circ$   
 D.  $90^\circ$  E.  $15^\circ$

## Mathematics 1985

1. Arrange the following numbers in ascending order of magnitude  $6/7, 13/15, 0.865$   
 A.  $6/7 < 0.865 < 13/15$   
 B.  $6/7 < 13/15 < 0.865$   
 C.  $13/15 < 6/7 < 0.865$   
 D.  $13/15 < 0.865 < 6/7$   
 E.  $0.865 < 6/7 < 13/15$
2. A sum of money was invested at 8% per annum simple interest. If after 4 years the money amounts to #330.00, find the amount originally invested.  
 A. #180.00 B. #165.00 C. #150.00  
 D. #200.00 E. #250.00
3. In the equation below, solve for x if all the numbers are in base 2?  $11/x = 1000/(x + 101)$   
 A. 101 B. 11 C. 110  
 D. 111 E. 10
4. List all integers satisfying the inequality  $-2 < 2x - 6 < 4$   
 A. 2,3,4,5 B. 2,3,4 C. 2,5  
 D. 3,4,5 E. 4,5
5. Find correct to two decimal places  $100 + 1/100 + 3/1000 + 27/10000$   
 A. 100.02 B. 1000.02  
 C. 100.22 D. 100.01  
 E. 100.51
6. Simplify  $1/2 + \frac{1}{2 + \frac{1}{2 - \frac{1}{4 + 1/5}}}$   
 A.  $3/4$  B.  $-1/3$  C.  $169/190$   
 D.  $13/15$  E.  $1^{21}/_{169}$
7. If three numbers p, q, r are in the ratio 6:4:5 find the value of  $(3a - a)/(4a + r)$   
 A.  $3/2$  B.  $2/3$  C. 2  
 D. 3 E. 18
8. Without using tables, evaluate  $\log_2 4 + \log_4 2 - \log_{25} 5$   
 A.  $1/2$  B.  $1/5$  C. 0  
 D. 5 E. 2
9. John gives one third of his money to Janet who has #105.00. He then finds that his money is reduced to one-fourth of what Janet now has. Find how much money John had at first.  
 A. #45.00 B. #48.00 C. #52.00  
 D. #58.00 E. #60.00
10. Find x if  $\log_9 x = 1.5$   
 A. 72.0 B. 27.0 C. 36.0  
 D. 3.5 E. 24.5
11. Write h in terms of  $a = \frac{b(1 - ch)}{1 - dh}$   
 A.  $h = \frac{a - b}{ad - bc}$  B.  $h = \frac{a + b}{ad - bc}$   
 C.  $h = \frac{ad - bc}{a - b}$  D.  $h = \frac{1 - b}{d - bc}$   
 E.  $h = \frac{b - a}{ad - bc}$
12.  $22\frac{1}{2}\%$  of the Nigerian Naira is equal to  $17\frac{1}{10}\%$  of a foreign currency M. what is the conversion rate of the M to the Naira?  
 A.  $1M = \frac{15}{57}N$  B.  $1M = 2\frac{11}{57}N$   
 C.  $1M = 1\frac{18}{57}N$  D.  $1M = 38\frac{1}{4}N$   
 E.  $1M = 384\frac{3}{4}N$
13. Find the values of p for which the equation  $x^2 - (p - 2)x + 2p + 1 = 0$  has equal roots  
 A. (0,12) B. (1,2) C. (21,0)  
 D. (4,5) E. (3,4)

14. If  $e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$  find  $1/e^{1/2}$   
 A.  $1 - \frac{x}{2} + \frac{x^2}{2 \cdot 12^3} - \frac{x^3}{2^4 \cdot 3} + \dots$  B.  $1 + \frac{x}{2} + \frac{x^2}{2 \cdot 1 \cdot 2^2} + \frac{x^3}{2^3 \cdot 3}$   
 C.  $1 + \frac{x}{2} + \frac{x^2}{1 \cdot 2^3} - \frac{x^3}{2^4 \cdot 3} + \dots$  D.  $1 - \frac{x}{2} + \frac{x^2}{1 \cdot 2^2} - \frac{x^3}{2^3 \cdot 3} + \dots$   
 E.  $1 + \frac{x^3}{1 \cdot 2} - \frac{x^3}{12 \cdot 4} - \frac{x^4}{12 \cdot 6} + \dots$

5.  $(4\sqrt{3} + 4\sqrt{2})(4\sqrt{3} - 4\sqrt{2})(3\sqrt{3} + \sqrt{2})$  is equal to  
 A. 0 B.  $4\sqrt{3} + 4\sqrt{2}$   
 C.  $(4\sqrt{2} - 4\sqrt{3})(\sqrt{3} + \sqrt{2})$   
 D.  $\sqrt{3} + \sqrt{2}$  E. 1

16. In a restaurant, the cost of providing a particular type of food is partly constant and partly inversely proportional to the number of people. If the cost per head for 100 people is 30k and the cost for 40 people is 60k, find the cost for 50 people  
 A. 15k B. 45k C. 20k  
 D. 50k E. 40k

17. The factors of  $9 - (x^2 - 3x - 1)^2$  are  
 A.  $-(x - 4)(x + 1)(x - 1)(x - 2)$   
 B.  $(x - 4)(x - 1)(x - 1)(x + 2)$   
 C.  $-(x - 2)(x + 1)(x + 2)(x + 4)$   
 D.  $(x - 4)(x - 3)(x - 2)(x + 1)$   
 E.  $(x - 2)(x + 2)(x - 1)(x + 1)$

18. If  $3^{2y} - 6(3^y) = 27$  find y  
 A. 3 B. -1 C. 2  
 D. -3 E. 1

19. Factorize  $abx^2 + 8y - 4bx - 2axy$   
 A.  $(ax - 4)(bx - 2y)$  B.  $(ax + b)(x - 8y)$   
 C.  $(ax - 2y)(by - 4)$  D.  $(abx - 4)(x - 2y)$   
 E.  $(bx - 4)(ax - 2y)$

20. At what real value of x do the curves whose equations are  $y = x^3 + x$  and  $y = x^2 + 1$  intersect?  
 A. -2 B. 2 C. -1  
 D. 0 E. 1

21. If the quadrilateral function  $3x^2 - 7x + R$  is a perfect square find R  
 A.  $49/24$  B.  $49/3$  C.  $49/6$   
 D.  $49/12$  E.  $49/36$

22. Solve the following equation  $2/(2r - 1) - 5/3 = 1/(r + 2)$   
 A.  $(-1, 5/2)$  B.  $(-1, -5/2)$   
 C.  $(5/2, 1)$  D.  $(2, 1)$   
 E.  $(1, 2)$

23. Solve for (x,y) in the equations  $2x + y = 4; x^2 + xy = -12$   
 A.  $(6, -8); (-2, 8)$  B.  $(3, -4); (-1, 4)$   
 C.  $(8, -4); (-1, 4)$  D.  $(-8, 6); (8, -2)$   
 E.  $(-4, 3); (4, -1)$

24. Solve the simultaneous equations  $2x - 3y + 10 = 10x - 6y = 5$   
 A.  $x = 2\frac{1}{2}, y = 3\frac{1}{3}$  B.  $x = 3\frac{1}{2}, y = 2\frac{1}{3}$   
 C.  $x = 2\frac{1}{4}, y = 3$  D.  $x = 3\frac{1}{2}, y = 2\frac{1}{5}$   
 E.  $x = 2\frac{1}{2}, y = 2\frac{1}{3}$

25. If  $f(x - 2) = 4x^2 + x + 7$  find  $f(1)$   
 A. 12 B. 27 C. 7  
 D. 46 E. 17

26. In DXYZ, XY = 13cm, YZ = 9cm, XZ = 11cm and  $\angle XYZ = q^\circ$ . find  $\cos q^\circ$   
 A.  $4/39$   
 B.  $43/39$   
 C.  $209/286$   
 D.  $1/6$   
 E.  $43/78$

27. Find the missing value in the table below

|                   |    |    |   |   |   |    |
|-------------------|----|----|---|---|---|----|
| x                 | -2 | -1 | 0 | 1 | 2 | 3  |
| $y = x^2 - x + 3$ |    | 3  | 3 | 3 | 9 | 27 |

- A. -32 B. -14 C. 40  
 D. 22 E. 37

28. Find the number of goals scored by a football team in 20 matches is shown below

|                |   |   |   |   |   |   |
|----------------|---|---|---|---|---|---|
| No. of goals   | 0 | 1 | 2 | 3 | 4 | 5 |
| No. of matches | 3 | 5 | 7 | 4 | 1 | 0 |

What are the values of the mean and the mode respectively?

- A.  $(1.75, 5)$  B.  $(1.75, 2)$   
 C.  $(1.75, 1)$  D.  $(2, 2)$   
 E.  $(2, 1)$

29. If the hypotenuse of a right angle isosceles triangle is 2, what is the length of each of the other sides?

- A.  $\sqrt{2}$  B.  $1/\sqrt{2}$  C.  $2\sqrt{2}$   
 D. 1 E.  $\sqrt{2} - 1$

30. If two fair coins are tossed, what is the probability of getting at least one head?

- A.  $1/4$  B.  $1/2$  C. 1  
 D.  $2/3$  E.  $3/4$

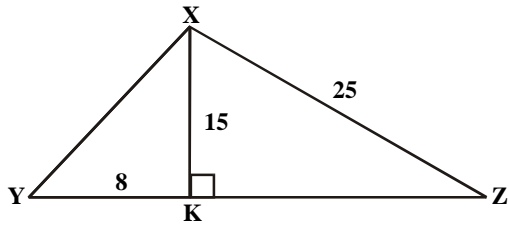
31. The ratio of the length of two similar rectangular blocks is 2:3, if the volume of the larger block is  $351 \text{ cm}^3$ , then the volume of the other block is

- A.  $234.00 \text{ cm}^3$  B.  $526.50 \text{ cm}^3$   
 C.  $166.00 \text{ cm}^3$  D.  $729.75 \text{ cm}^3$   
 E.  $104.00 \text{ cm}^3$

32. The bearing of bird on a tree from a hunter on the ground is  $N72^\circ E$ . what is the bearing of the hunter from the bird?

- A.  $S18^\circ W$  B.  $S72^\circ W$   
 C.  $S72^\circ E$  D.  $S27^\circ E$   
 E.  $S27^\circ W$

33.



In  $\triangle XYZ$  above,  $\angle XKZ = 90^\circ$ ,  $XK = 15\text{cm}$ ,  $XZ = 25\text{cm}$  and  $YK = 8\text{cm}$ . Find the area of the  $\triangle XYZ$ .

- A. 180sq.cm      B. 210sq.cm  
 C. 160sq.cm      D. 320sq.cm  
 E. 390sq.cm

34.

Without using tables. Calculate the value of  $1 + \sec^2 30^\circ$ ?

- A.  $2\frac{1}{3}$       B. 2      C.  $1\frac{1}{3}$   
 D.  $\frac{3}{4}$       E.  $\frac{3}{7}$

35.

What is the probability that a number chosen at random from the integers between 1 and 10 inclusive is either a prime or a multiple of 3?

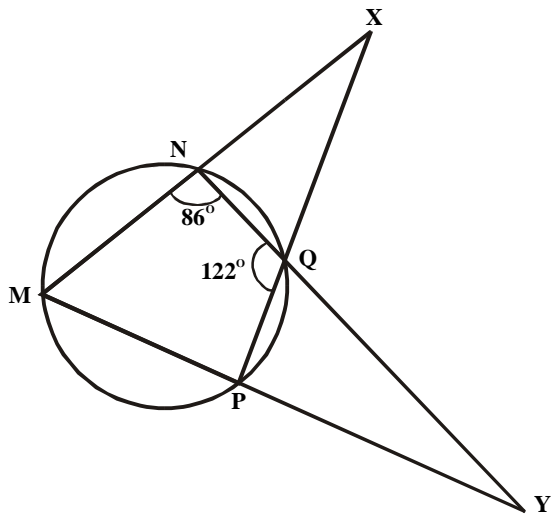
- A.  $\frac{7}{10}$       B.  $\frac{3}{5}$       C.  $\frac{4}{5}$   
 D.  $\frac{1}{2}$       E.  $\frac{3}{10}$

36.

Find the area of a regular hexagon inscribed in a circle of radius 8cm.

- A.  $16\sqrt{3}\text{cm}^2$       B.  $96\sqrt{3}\text{cm}^2$   
 C.  $192.3\text{cm}^2$       D.  $16\text{cm}^2$   
 E.  $32\text{cm}^2$

37.



In the figure above, MNOP is a cyclic quadrilateral, MN and PQ are produced to meet at X and NQ and MP are produced to meet at Y. if  $\angle MNQ = 86^\circ$  and  $\angle NQP = 122^\circ$ , find  $(x^\circ, y^\circ)$

- A.  $(28^\circ, 36^\circ)$       B.  $(36^\circ, 28^\circ)$   
 C.  $(43^\circ, 61^\circ)$       D.  $(61^\circ, 43^\circ)$   
 E.  $(36^\circ, 43^\circ)$

38.

If  $\cos q = \frac{\sqrt{3}}{2}$  and  $0$  is less than  $90^\circ$ , calculate  $\cot(90^\circ - q) / \sin^2 q$

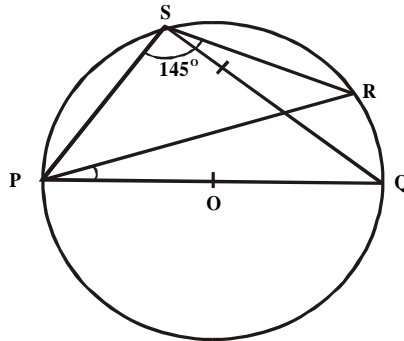
- A.  $4\sqrt{3}/3$       B.  $4\sqrt{3}$   
 C.  $\sqrt{3}/2$       D.  $1/\sqrt{3}$   
 E.  $2\sqrt{3}$

39.

A solid sphere of radius 4cm has mass of 64kg. What will be the mass of a shell of the same metal whose internal and external radii are 2cm and 3cm respectively?

- A. 5kg      B. 16kg      C. 19kg  
 D. 25kg      E. 48kg

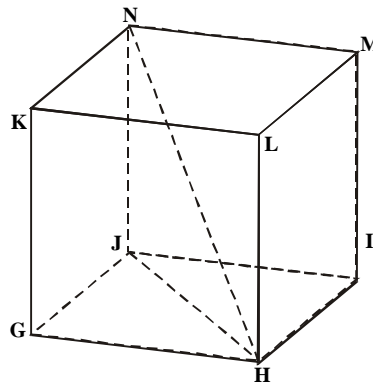
40.



In the figure above POQ is the diameter of the circle PQRS. If  $\angle PSR = 145^\circ$ , find  $x^\circ$

- A.  $25^\circ$       B.  $35^\circ$       C.  $45^\circ$   
 D.  $55^\circ$       E.  $25^\circ$

41.



In the figure above GHIJKLMN is a cube of side a. find the length of HN

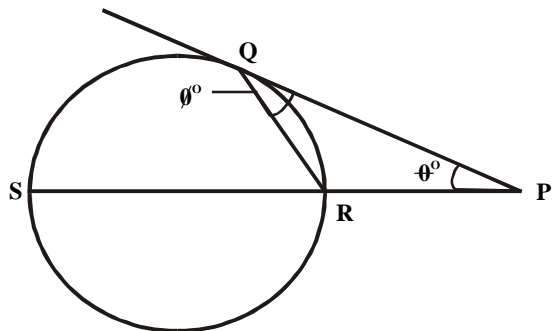
- A.  $3\sqrt{a}$       B.  $3a$       C.  $3a^2$   
 D.  $a\sqrt{2}$       E.  $a\sqrt{3}$

42.

PQRS is a trapezium of area  $14\text{cm}^2$  in which  $PQ/RS$ , if  $PQ = 4\text{cm}$  and  $SR = 3\text{cm}$ , find the area of DSQR in  $\text{cm}^2$

- A. 7.0      B. 6.0      C. 5.2  
 D. 5.0      E. 4.1

43.



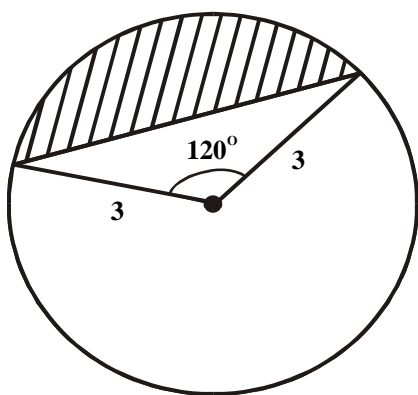
In the figure PQ is the tangent from P to the circle QRS with SR as its diameter. If  $\angle PQR = q^\circ$ , which of the following relationship  $0^\circ$  is correct.?

- A.  $q^\circ + f^\circ = 90^\circ$       B.  $f^\circ = 90^\circ - 2q^\circ$   
 C.  $q^\circ = f^\circ$       D.  $f^\circ = 2q^\circ$   
 E.  $q^\circ + 2f^\circ = 120^\circ$

44. A bag contains 4 white balls and 6 red balls. Two Redballs are taken from the bag without replacement. What is the probability that they are both red?  
 A.  $1/3$     B.  $2/9$     C.  $2/15$   
 D.  $1/5$     E.  $3/5$
45. How many  $2\sqrt{2}$ cm diameter discs can be cut out of a sheet of cardboard  $2^{18}\sqrt{2}p^{3/4}$ cm long and  $\sqrt{p}^{1/2}$ cm wide?  
 A.  $4^p$     B.  $2^{19}$     C.  $2^{17}p^{3/4}(\sqrt{2}p+2)$   
 D.  $2^{10}p^{3/4}(1+\sqrt{2})$     E.  $2^9(\sqrt{2}+1)$

46. Two points X and Y both on latitude  $60^\circ$ S have longitudes  $147^\circ$ E and  $153^\circ$ W respectively. Find to the nearest kilometre the distance between X and Y measured along the parallel of latitudes (Take  $2\pi R = 4 \times 10^4$ km, where R is the radius of the earth).  
 A. 28.850km    B. 16.667km  
 C. 8.333km    D. 6.667km  
 E. 3.333km

47.

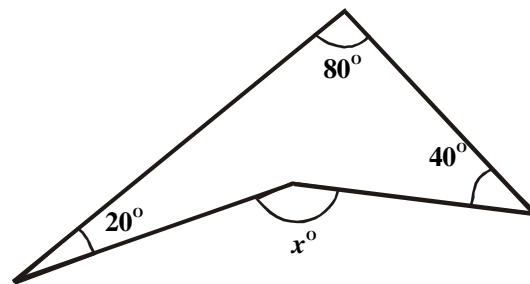


In the figure above the area of the shaded segment is

- A.  $3p$     B.  $9\sqrt{3}/4$   
 C.  $3(p - 3\sqrt{3}/4)$     D.  $3(\sqrt{3} - p)/4$   
 E.  $p + 9\sqrt{3}/4$

48. In a class of 120students, 18 of them scored an A grade in Mathematics. If the section representing the A grade students on a pie chart has angle  $Z^\circ$  at the centre of the circle, what is Z?  
 A. 15    B. 28    C. 50  
 D. 52    E. 54

49.



In the figure above find the angle x

- A.  $100^\circ$     B.  $120^\circ$     C.  $60^\circ$   
 D.  $110^\circ$     E.  $140^\circ$

50. If  $a \frac{(x+1) - (x+1)}{(x-2)(n+2)} = bx$

Find a simplest form

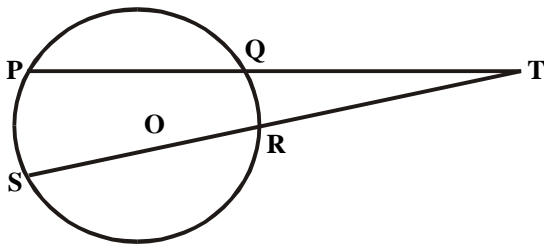
- A.  $x^2 - 1$     B.  $x^2 + 1$     C.  $x^2 + 4$   
 D. 1    E.  $x^2 - 4$

## Mathematics 1986

1. Evaluate  $(212)_3 - (121)_3 + (222)_3$   
 A.  $(313)_3$     B.  $(1000)_3$   
 C.  $(1020)_3$     D.  $(1222)_3$
2. If Musa scored 75 in Biology instead of 57, his average mark in four subjects would have been 60. what was his total mark?  
 A. 282    B. 240  
 C. 222    D. 210
3. Divide the L.C.M. of 48, 64 and 80 by their H.C.F  
 A. 20    B. 30  
 C. 48    D. 60
4. Find the smallest number by which 252 can be multiplied to obtain a perfect square  
 A. 2    B. 3  
 C. 5    D. 7
5. Find the reciprocal of  $\frac{2/3}{1/2 + 1/3}$   
 A.  $4/5$     B.  $5/4$   
 C.  $2/5$     D.  $6/7$
6. Three boys shared some oranges. The first receive  $1/3$  of the oranges, the second received  $2/3$  of the remainder, if the third boy received the remaining 12 oranges. How many oranges did they share?  
 A. 60    B. 54  
 C. 48    D. 42
7. If  $P = 18$ ,  $Q = 21$ ,  $R = -6$  and  $S = -4$  calculate  $(P - Q) + S^2$   
 A.  $-11/216$     B.  $11/216$   
 C.  $-43/115$     D.  $41/116$

8. Simplify  $\frac{0.03 \times 4 \times 0.00064}{0.48 \times 0.012}$
- A.  $3.6 \times 10^2$       B.  $36 \times 10^2$   
C.  $3.6 \times 10^3$       D.  $3.6 \times 10^4$
9. Udoh deposited #150 00 in the bank. At the end of 5 years the simple interest on the principal was #55 00. At what rate per annum was the interest paid?
- A. 11%      B.  $7\frac{1}{3}\%$   
C. 5%      D.  $3\frac{1}{2}\%$
10. A number of pencils were shared out among Bisi, Sola and Tunde in the ratio 2:3:5 respectively. If Bisi got 5, how many were shared out?
- A. 15      B. 25  
C. 30      D. 50
11. The ages of Tosan and Isa differ by 6 and the product of their ages is 187. write their ages in the form (x, y), where  $x > y$
- A. (12, 9)      B. (23, 17)  
C. (17, 11)      D. (18, 12)
12. In 1984, Ike was 24 years old and his father was 45 years old in what year was Ike exactly half his father's age?
- A. 1982      B. 1981  
C. 1979      D. 1978
13. Simplify  $(\frac{1}{\sqrt{5} + \sqrt{3}} - \frac{1}{\sqrt{5} - \sqrt{3}})x - 1/\sqrt{3}$
- A.  $\sqrt{3}/\sqrt{5}$       B.  $-2/\sqrt{3}$   
C. -2      D. -1
14. Find n if  $\text{Log}_2 4 + \text{Log}_2 Z - \text{Log}_2 n = -1$
- A. 10      B. 14  
C. 27      D. 28
15.  $(91/3 \times 27 - 1/2) / (3^{-1/6} \times 3^{-2/3})$
- A. 1/3      B. 1  
C. 3      D. 9
16. If x varies directly as  $y^3$  and  $x = 2$  when  $y = 1$ , find x when  $y = 5$
- A. 2      B. 10  
C. 125      D. 250
17. Factorize completely.
- $3a + 125ax^3$
- A.  $(2a + 5x^2)(4 + 25ax)$   
B.  $a(2 + 5x)(4 - 10x + 25ax^2)$   
C.  $(2a + 5x)(4 - 10ax + 25ax^2)$   
D.  $a(2 + 5x)(4 + 10ax + 25ax^2)$
18. If  $y = x/(x - 3) + x/(x + 4)$  find y when  $x = -2$
- A. -3/5      B. 3/5  
C. -7/5      D. 7/5
19. Find all the numbers x which satisfy the inequality  $1/3(x + 1) - 1 > 1/5(x + 4)$
- A.  $x < 11$       B.  $x < -1$   
C.  $x > 6$       D.  $x > 11$
20. Factorize  $x^2 + 2a + ax + 2x$
- A.  $(x + 2a)(x + 1)$       B.  $(x + 2a)(x - 1)$   
C.  $(x^2 - 1)(x + a)$       D.  $(x + 2)(x + a)$
21. Solve the equation  $3x^2 + 6x - 2 = 0$
- A.  $x = -1, \pm\sqrt{3}/3$       B.  $x = -1, \pm\sqrt{15}/3$   
C.  $x = -2, \pm\sqrt{3}/3$       D.  $x = -2, \pm\sqrt{15}/3$
22. Simplify.  $1/5x + 5 + 1/7x + 7$
- A.  $12/35 + 7$       B.  $1/35(x + 1)$   
C.  $12x/35(x + 1)$       D.  $12/35x + 35$
23. The curve  $y = -x^2 + 3x + 4$  intersects the coordinate axes at
- A. (4,0)(0,0)(-1,0)      B. (-4,0)(0,4)(1,1)  
C. (0,0)(0,1)(1,0)      D. (0,4)(4,0)(-1,0)
24. Factorize  $(4a + 3)^2 - (3a - 2)^2$
- A.  $(a + 1)(a + 5)$       B.  $(a - 5)(7a - 1)$   
C.  $(a + 5)(7a + 1)$       D.  $a(7a + 1)$
25. If  $5^{(x + 2y)} = 5$  and  $4^{(x + 3y)} = 16$ , find  $3^{(x + y)}$
- A. 0      B. 1  
C. 3      D. 27
26. Simplify  $1/x - 2 + 1/x + 2 + 2x/x^2 - 4$
- A.  $2x/(x - 2)(x + 2)(x^2 - 4)$       B.  $2x/x^2 - 4$   
C.  $x/x^2 - 4$       D.  $4x/x^2 - 4$
27. Make r the subject of the formula  
 $S = 6/v - w/2$
- A.  $V = \frac{6}{S^2} = \frac{12}{w}$       B.  $v = \frac{12}{25^2 - w}$   
C.  $v = \frac{12}{w} - 2s^2$       D.  $v = \frac{12}{2s^2 + w}$
28. Find the values of x which satisfy the equation  
 $16^x - 5x \cdot 4^x + 4 = 0$
- A. 1 and 4      B. -2 and 2  
C. 0 and 1      D. 1 and 0
29.  $a/b - c/d = k$ , find the value of  $(3a^2 - ac + c^2)/(3b^2 - bd + d^2)$  in term of k
- A.  $3k^2$       B.  $3k - k^2$   
C.  $17k^2/4$       D.  $k^2$
30. At what point does the straight line  $y = 2x + 1$  intersect the curve  $y = 2x^2 + 5x - 1$ ?
- A. (-2, -3) and (1/2, 2)      B. (-1/2, 0) and (2, 5)  
C. (1/2, 2) and (1, 3)      D. (1, 3) and (2, 5)
31. A regular polygon on n sides has  $160^\circ$  as the size each interior. Find n.
- A. 18      B. 16  
C. 14      D. 12
32. If  $\cos q = a/b$ , find  $1 + \tan^2 q$
- A.  $b^2/a^2$       B.  $a^2/b^2$   
C.  $(a^2 + b^2)/(b^2 - a^2)$       D.  $(2a^2 + b^2)/(a^2 + b^2)$

33. In the diagram below, PQ and RS are chords of a circle centre O which meet at T outside the circle. If TP = 24cm, TQ = 8cm and TS = 12cm, find TR.



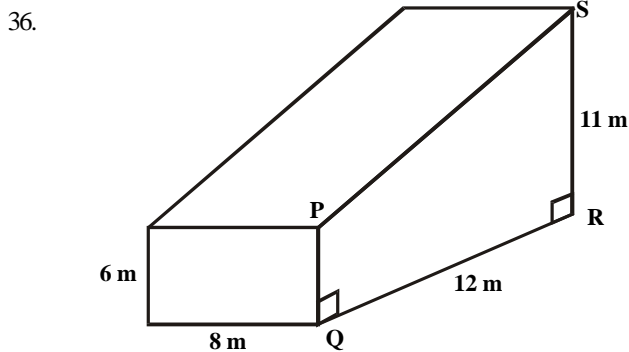
- A. 16cm                      B. 14cm  
C. 12cm                      D. 8cm

34. The angle of elevation of the top of a vertical tower 50 metres high from a point X on the ground is  $30^\circ$ . From a point Y on the opposite side of the tower, the angle of elevation of the top of the tower is  $60^\circ$ . find the distance between the points X and Y.

- A. 14.43m                      B. 57.73m  
C. 101.03m                      D. 115.47m

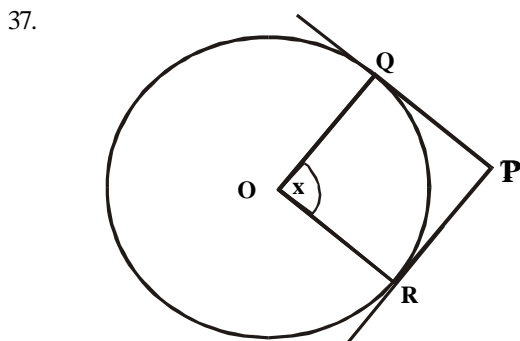
35. A girl walk 45 metres in the direction  $050^\circ$  from a point Q to a point X. She then walks 24metres in the direction  $140^\circ$  from X to a point Y. How far is she then from Q?

- A. 69m                      B. 57m  
C. 51m                      D. 21m



The figure is a solid with the trapezium PQRS as its uniform cross-section. Find its volume

- A.  $102\text{m}^3$                       B.  $576\text{m}^3$   
C.  $816\text{m}^3$                       D.  $1056\text{m}^3$

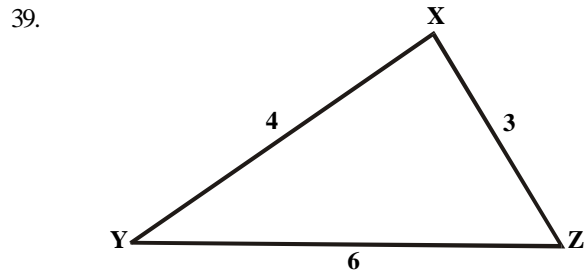


PQ and PR are tangents from P to a circle centre O as shown in the figure above. If  $\text{QRP} = 34^\circ$ . Find the angle marked x.

- A.  $34^\circ$                       B.  $56^\circ$   
C.  $68^\circ$                       D.  $112^\circ$

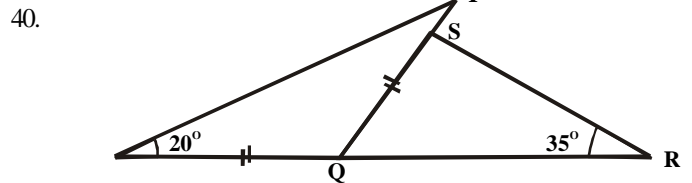
38. An arc of circle of radius 6cm is 8cm long. Find the area of the sector.

- A.  $5\frac{1}{3}\text{cm}^2$                       B.  $24\text{cm}^2$   
C.  $36\text{cm}^2$                       D.  $48\text{cm}^2$



In  $\triangle XYZ$  above, determine the cosine of angle Z

- A.  $\frac{3}{4}$                       B.  $\frac{29}{36}$   
C.  $\frac{2}{3}$                       D.  $\frac{1}{2}$



In the figure above  $\triangle PQT$  is isosceles.  $PQ = QT$ .  $\text{SRQ} = 35^\circ$ ,  $\text{TQ} = 20^\circ$  and PQR is a straight line. Calculate TSR.

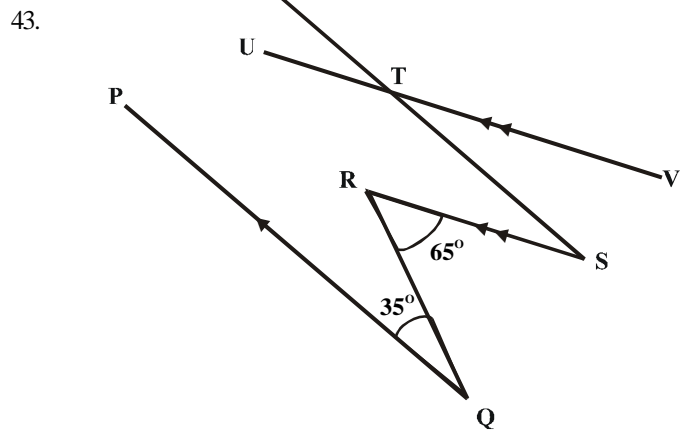
- A.  $20^\circ$                       B.  $55^\circ$   
C. 75                      D.  $140^\circ$

41. Find the total surface are of a solid cone of radius  $2\sqrt{3}\text{cm}$  and slanting side  $4\sqrt{3}\text{cm}$

- A.  $8\sqrt{3}\text{cm}^2$                       B.  $24\text{cm}^2$   
C.  $15\sqrt{3}\text{cm}^2$                       D.  $36\text{cm}^2$

42. If U and V are two distinct fixed points and W is a variable point such that UWW is a straight angle. What is the locus of W?

- A. The perpendicular bisector of UV  
B. A circle with UV as radius  
C. A line parallel to the line UV  
D. A circle with the line UV as the diameter



In the figure above,  $PQ \parallel ST$ ,  $RS \parallel UV$ . If  $\text{PQR} = 35^\circ$  and  $\text{QRS} = 65^\circ$ , find STV

- A.  $30^\circ$                       B.  $35^\circ$   
C.  $55^\circ$                       D.  $65^\circ$















































































































