Sample Paper - 1

GENERAL INSTRUCTIONS

All questions are compulsory.
The question paper consist of 30 questions divided into four sections A, B, C and D. Section A comprises of 6 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each, Section C comprises of 10 questions of 3 marks each and Section D comprises of 8 questions of 4 marks each.
There is no overall choice.
Use of calculator is not allowed.

SECTION-A

(1 mark each)

1. Find the number of digits in the square root of 4489. (Without any calculation).

2. Find product $(4p^2+5p+7)\times 3p$

3. Multiply the following :

(a) $15xy^2, 17yz^2$

(b) $-5a^2bc, 11ab, 13abc^2$

4. If x varies inversely as y when $x=40$, and $y=600$, then find y, when $x=400$.

5. Evaluate: 3^{-2}

6. Factorise: $3a^2b^3-27a^4b$.

SECTION-B

(2 marks each)

7. Find using distributivity: $\left[\frac{7}{5}\times\left(\frac{-3}{12}\right)\right]+\left[\frac{7}{5}\times\frac{5}{12}\right]$

8. Evaluate $\sqrt{2}$ correct upto two place of decimal.

9. A dodecahedron is having 20 vertices an 30 edges. How many faces are there?

10. Find the value of $\frac{38^2-22^2}{16}$, using a suitable identity.

11. If $x-\frac{1}{x}=7$, then find the value $x^2+\frac{1}{x^2}$.

12. Ayesha announced a festival discount of 25% on all the items in her mobile phone shop. Raman deep bought a mobile phone for himself. He got a discount of Rs. 1,960. What was the marked price of the mobile phone?

SECTION-C

(3 marks each)

13. Find the area of rectangular park which is $36\frac{3}{5}$ m long and $16\frac{2}{3}$ m broad.

(b) Write the name of property for any rational numbers $\frac{a}{b}$ and $\frac{c}{d}$, we have

$$\left(\frac{a}{b}\times\frac{c}{d}\right)=\left(\frac{c}{d}\times\frac{a}{b}\right)$$

14. Find area of a rhombus where diagonal are 12 cm and 9.2 cm.

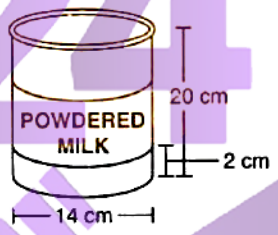
15. Radha takes some flowers in a basket and visits three temples one by one. At each temple, she offers one half of the flowers from the basket. If she is left with 3 flowers at the end, find the number of flowers she had in the beginning.

16. The area of a trapezium is 34 cm2 and the length of one of the parallel sides is 10 cm and its height is 4 cm. Find the length of the other parallel side.

17. Draw a rhombus ABCD such that AC = 6.6 cm, BD = 5.6 cm.

18. Divide: $15(y+3)(y^2-16)by\ 5(y^2-y-12)$.

19. A company packages its milk powder in cylindrical container where base has a diameter of 14 cm and height 20 cm. Company places a label around the surface area the container (as shown in the figure). If the label is placed 2 cm from top and bottom, what is the area of the label.



20. The population of a place increased to 54,000 in 2003 at a rate of 5% per annum
(a) Find the population in 2001.
(b) What would be its population in 2005?

21. Two cubes have volumes is the ratio 1: 64. The ratio of the area of a face of first cube to the of other is?

22. If $x+\frac{1}{x}=5,$, find the value of $x^2+\frac{1}{x^2}$.

SECTION-D

(4 marks each)

23. Using appropriates find

(a) $-\frac{2}{3}\times\frac{3}{5}+\frac{5}{2}-\frac{3}{5}\times\frac{1}{6}$

(b) $\frac{2}{5}\times\left(-\frac{3}{7}\right)-\frac{1}{6}\times\frac{3}{2}+\frac{1}{14}\times\frac{2}{5}$

24. Rehman is making a wheel using spokes. He wants to fix equal spokes in such a way that the angles between any pair of consecutive spokes are equal. Help him by completing the following table.

Number of spokes	4	6	8	10	12
Angle between a pair of consecutive spokes	90°	60°	-	-	-

(a) Are the number of spokes and the angles formed between the pairs of consecutive spokes in inverse proportion?
(b) Calculate the angle between a pair of consecutive spokes on a wheel with 15 spokes.
(c) How many spokes would be needed, if the angle between a pair of consecutive spokes is 40° ?

25. The parallel sides of a trapezium are 40 cm and 20 cm. If its non-parallel sides are equal, each being 26 cm, find the area of the trapezium.

26. A rational number is such that when you multiply it by $\frac{5}{2}$ and add $\frac{2}{3}$ to the product, you get $\frac{-7}{12}$. what is the number?

27. Find the
(a) Probability of the pointer stopping on D in (figure 1)
(b) Probability of getting an ace from a well shuffled deck of 52 playing cards.
(c) Probability of getting a red apple.

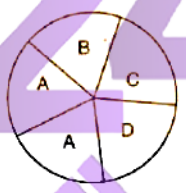


fig. 1

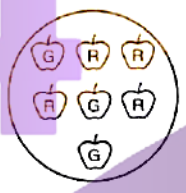


fig. 2

28. Simplify
(a) $(a^2-b^2)^2$
(b) $(2x+5)^2-(2x-5)^2$
(c) $(7m+8n)^2+(7m+8n)^2$
(d) $(4m+5n)^2+(5m+4n)^2$

29. Arif took a loan for Rs. 80,000 from a bank. If the rate of interest is 10% per annum. Find the difference in amounts he would be paying after $1\frac{1}{2}$ years if the interest is
(a) Compounded annually.
(b) Compounded half yearly.

30. Carry out the following divisions :
(a) $28x^4 \div 56x$ (b) $-36y^3 \div 9y^2$
(c) $66pq^2r^3 \div 11qr^2$ (d) $34x^3y^3z^3 \div 51xy^3z^3$

Solutions

Section 'A'

(1 marks each)

1. For 4489, $n = 4$ [Even number] **½**

$\therefore$ Number of digits in its square root $= \frac{n}{2} = \frac{4}{2} = 2$ **½**

2. $(4p^2 + 5p + 7) \times 3p = (4p^2 \times 3p) + (5p \times 3p) + (7 \times 3p)$

$= (12p^3 + 15p^2 + 21p)$ **1**

3. (a) $15xy^2 \times 17yz^2 = (15 \times 17) \times x \times y^2 \times y \times z^2$

$= 255xy^3z^2$ **½**

(b) $-5a^2bc \times 11ab \times 13abc^2 = (-5 \times 11 \times 13)a^2bc \times ab \times abc^2$

$= -715a^4b^3c^3$ **½**

4. Here, x varies inversely as y

Hence, $x_1y_1 = x_2y_2$

$\because x_1 = 40, y_1 = 600, x_2 = 400, y_2 = ?$

$40 \times 600 = 400 \times y_2$

$\Rightarrow \quad y_2 = \frac{40 \times 600}{400} = 60$ **1**

5. $3^{-2} = \frac{1}{3^2} = \frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$

6. $3a^2b^3 - 27a^4b = 3a^2b(b^2 - 9a^2)$

$= 3a^2b[(b)^2 - (3a)^2]$

$= 3a^2b(b + 3a)(b - 3a)$

Section 'B'

(2 marks each)

7. $\left[\frac{7}{5} \times \left(\frac{-3}{12}\right)\right] + \left[\frac{7}{5} \times \frac{5}{12}\right] = \frac{7}{5} \times \left\{\left(\frac{-3}{12}\right) + \frac{5}{12}\right\}$

$= \frac{7}{5} \times \left\{\frac{-3+5}{12}\right\}$

$= \frac{7}{5} \times \frac{2}{12} = \frac{7}{5} \times \frac{1}{6} = \frac{7}{30}$ **1**

8. Using division method

1.414

1	$2.\overline{00}\ \overline{00}\ \overline{00}$ _1
24	100 _ 96
281	400 _281
2824	11900 _11296
	604

Therefore $\sqrt{2}=1.414 \Rightarrow \sqrt{2}=1.41$ **2**

9. Here:

Number of vertices (V) $=20$

Number of edges (E) $=30$

Let the number of faces $=F$

Then using Euler's formula, we have

$F+V=E+2$ .....(1) **1**

$\therefore$ Substituting the values of V and E in(1) ,we get

$F+20=30+2$

$\Rightarrow$ $F+20=32$

$\Rightarrow$ $F=32-20$

$\Rightarrow$ $F=12$

Thus, the required number of faces=12.

1

10. Since, $a^2-b^2=(a+b)(a-b)$ therefore,

$38^2-22^2-(38-22)(38+22)$ **1**

$=16\times16$

So, $\dfrac{38^2-22^2}{16}=\dfrac{16\times60}{16}$

$=60$ **1**

11. We know that $(a-b)^2=a^2-2ab+b^2$

$\therefore$ $\left(x-\dfrac{1}{x}\right)^2=(x)^2-2(x)\left(\dfrac{1}{x}\right)+\left(\dfrac{1}{x}\right)^2$ **1**

$$\left(x-\frac{1}{x}\right)^2 = x^2 - 2 + \frac{1}{x^2}$$

$$(7)^2 = x^2 - 2 + \frac{1}{x^2}$$

$$49 + 2 = x^2 + \frac{1}{x^2}$$

$$x^2 + \frac{1}{x^2} = 51$$ **1**

12. Discount amount = Rs. 1960

and discount rate = 25% **½**

When discount Rs. 25, then the marked price = Rs. 100
On discount Rs.1, then the marked price

$$= \frac{Rs.100}{25}$$ **½**

On discount Rs. 1960, then the marked price

$$= \frac{100}{25} \times 1960$$

= Rs. 7840 **1**

Hence, marked price of the mobile phone is Rs. 7840.

Section 'C'

(3 marks each)

13. **(a)** Since length of rectangular park $= 36\frac{3}{5}\text{ m} = \frac{183}{5}\text{ m}$

and breadth of rectangular park $= 16\frac{2}{3}\text{ m} = \frac{50}{3}\text{ m}$ **1**

Then area of park $= l \times b$

$$= \frac{183}{5}m \times \frac{50}{3}m$$

$$= 61 \times 10m^2 = 610m^2$$

(b)

$\left(\frac{a}{b} \times \frac{c}{d}\right) = \left(\frac{c}{d} \times \frac{a}{b}\right)$, it is commutative law of property. **1**

14. Let d_1 and and d_2 be the diagonals of the rhombus.

d_1 = 12 cm d_2 and = 9.2 cm **1**

$$\text{Area} = \frac{1}{2} \times d_1 \times d_2$$

$$= \frac{1}{2} \times 12 \times 9.2$$

$= 55.2\ cm^2$ **2**

15. Let she had x flowers,

I temple visit

$$\text{No of flowers} = x - \frac{x}{2}$$

$$= \frac{x}{2}$$ **½**

II temple visit

No. of flowers $= \frac{x}{4} - \frac{1}{2}\left(\frac{x}{4}\right)$

$= \frac{x}{4} - \frac{x}{8}$

$= \frac{2x - x}{8}$

$= \frac{x}{8}$ **1**

According to condition,

$$\frac{x}{8} = 3$$

$\therefore \quad x = 24$ **½**

16. Height of trapezium (h) = 4 cm

Length of one parallel side = 10 cm

Second parallel side =?

The area of trapezium $= \frac{1}{2} \times h \times$ (sum of parallel sides) **1**

$\Rightarrow 34 = \frac{1}{2} \times 4 \times$ (10 + second parallel side)

$\Rightarrow \frac{34}{2} = 10 + \text{second parallel side}$

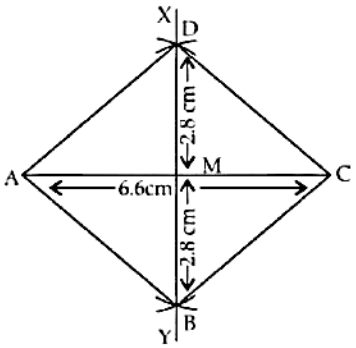
$\Rightarrow 17 - 10 = \text{second parallel side}$

$\therefore$ other parallel side of trapezium = 7 cm **2**

17. Steps of Construction :

(a) Draw a line segment AC = 6·6 cm.

(b) Draw perpendicular bisector XY of AC, which meets AC at M. **1**



(c) With centre M take the radius $= = \frac{1}{2} \times 5.6$ cm *i.e.*, 2·8 cm, draw arcs to intersect XY at B and D.

(d) Joint AB, BC, CD and AD.

Thus, $ABCD$ is the required rhombus. **1**

18. Factorising $15\ (y+3)(y^2-16)$,

We get, $5 \times 3 \times (y+3)(y-4)(y+4)$

On factorising, $5(y^2-y-12)$, we get

$5(y^2-4y+3y-12)$

$= 5\ [y(y-4)+3(y-4)]$

$= 5(y-4)(y+3)$ **1**

Therefore, on dividing the first expression by the second expression, we get $\frac{15(y+3)(y^2-16)}{5(y^2-y-12)}$

$\frac{5 \times 3 \times (y+3)(y-4)(y+4)}{5 \times (y-4)(y+3)}$

$= 3(y+4)$ **1**

19. Diameter of cylinder = 14 cm

r = 7 cm

The height of cylindrical label $= 20-4 = 16\ cm$

Curved surface area of cylindrical label

$= 2\pi rh =$

$= 2 \times \frac{22}{7} \times 7 \times 16$

$= 704\ cm^2$ **3**

20. **(a)** Here A = 54000, R = 5%, n = 2 year,

$\therefore\ P$ =?

$A = P\left(1+\frac{R}{100}\right)^n$

$54000 = P\left(1+\frac{5}{100}\right)^2$

$= P\left(\frac{21}{20}\right)^2$

$\Rightarrow \qquad P = \frac{54000 \times 20 \times 20}{21 \times 21}$

= 48980 (approx.) **1½**

$\therefore$ Population in 2001 was 48980.

(b) Here, P = 54000, R = 5% p.a., n = 2 years

$A = P\left(1+\frac{R}{100}\right)^n$

$= 54000\left(1+\frac{5}{100}\right)^2$

$= 54000 \times \frac{21}{20} \times \frac{21}{20}$

$= 59535$

Hence, population in 2005 would be 59535. **1½**

21. Volume,

$\frac{V_1}{V_2} = \frac{1}{64}$

$\frac{a_1^3}{a_2^3} = \frac{1}{64}$ **1**

$\frac{a_1}{a_2} = \frac{1}{4}$

Area of first face for first cube $= a_1 \times a_1$

$= 1 \times 1$ **1**

Area of first face of other cube $= a_2 \times a_2$

$= 4 \times 4$

1

Ratio will be $= \frac{1}{16}$

22. Since, $x + \frac{1}{x} = 5$

Squaring on both sides,

1

$\left(x + \frac{1}{x}\right)^2 = 5^2$ **1**

or $x^2 + \frac{1}{x^2} + 2 \times x \times \frac{1}{x} = (5)^2$

or $x^2 + \frac{1}{x^2} + 2 = 25$

or $x^2 + \frac{1}{x^2} = 25 - 2$

or $x^2 + \frac{1}{x^2} = 23$ **1**

Section 'D'

(4 marks each)

23. **(a)** $-\frac{2}{3} \times \frac{3}{5} + \frac{5}{2} - \frac{3}{5} \times \frac{1}{6} = -\frac{2}{3} \times \frac{3}{5} - \frac{3}{5} \times \frac{1}{6} + \frac{5}{2}$

$= \frac{3}{5}\left(-\frac{2}{3} - \frac{1}{6}\right) + \frac{5}{2}$ (by commutativity)

$= \frac{3}{5}\left(\frac{-4-1}{6}\right) + \frac{5}{2}$

$= \frac{3}{5} \times \frac{-5}{6} + \frac{5}{2}$

$= \frac{-1}{2} + \frac{5}{2} = 2$

(b) $\frac{2}{5} \times \left(\frac{-3}{7}\right) - \frac{1}{6} \times \frac{3}{2} + \frac{1}{14} \times \frac{2}{5} = \frac{2}{5} \times \left(\frac{-3}{7}\right) + \frac{1}{14} \times \frac{2}{5} - \frac{1}{6} \times \frac{3}{2}$

(by associativity)

$= \frac{2}{5} \times \left(\frac{-3}{7} + \frac{1}{14}\right) - \frac{1}{4}$ (by distributivity)

$= \frac{2}{5}\left(\frac{-6+1}{14}\right) - \frac{1}{4}$

$= \frac{2}{5} \times \frac{-5}{14} - \frac{1}{4}$

$= -\frac{1}{7} - \frac{1}{4} = \frac{-4-7}{28} = \frac{-11}{28}$ **2**

24. **(a)** Suppose number of spokes be x and angle between a pair of consecutive spokes be y.

X	4	6	8	10	12
y	90	60	y_1	y_2	y_3

As the number of spokes increase, angle between a pair of consecutive spokes decreases. Hence, it is a case of inverse proportion.

i.e., $x_1y_1 = x_2y_2$

(i) $x_1 = 6, x_2 = 8, y_1 = 60, y_2 = ?$

$6 \times 60° = 8y_1$

$\Rightarrow \quad y_1 = \frac{360°}{8} = 45°$ **1**

(ii) $8 \times 45° = 10 \times y_2$

$\Rightarrow \quad y_2 = \frac{360°}{10} = 36°$

(iii) $10 \times 36° = 12 \times y_3$

$\Rightarrow \quad y_3 = \frac{360°}{12} = 30°$

The table is

X	4	6	8	10	12
y	90°	60°	45°	36°	30°

The number of spokes and the angles formed between the pairs of consecutive spokes is in inverse proportion. Because the products of the corresponding values of two quantities is constant.

i.e $4 \times 90° = 6 \times 60° = 8 \times 45° = 10 \times 36° = 12 \times 30° = 360°$ **1**

(b) Let the angle be x . The following table

No. of spokes	12	15
Angle	30°	x

As number of spokes increases, the angle decreases it is the case of inverse proportion.

i.e. $x_1y_1 = x_2y_2$

$12 \times 30° = 15 \times x$

$\Rightarrow \quad x = \frac{12 \times 30°}{15} = 24°$

Thus, angle is 24°. **1**

(c) Let the spokes be x, if the angle between a pair of consecutive spokes is 40°.

We have the following table.

No. of spokes	**4**	**6**	**8**	**X**	**10**	**12**
Angle	90°	60°	45°	40°	36°	30°

As no. of spokes increases the angle decreases. Hence, it is the case of inverse proportion

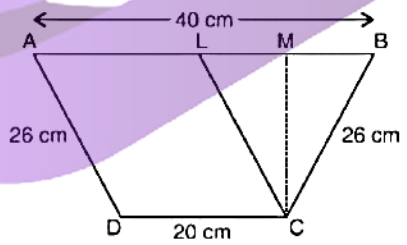
We have, $8 \times 45° = x \times 40°$

$\Rightarrow \quad x = \frac{8 \times 45}{40°}$

$\Rightarrow \quad x = 9$

Hence, the number of spokes are 9. **1**

25. Let $ABCD$ be the trapezium such that $AB = 40$ cm and $CD = 20$ cm and $AD = BC = 26$ cm.



Now, draw $CL \| AD$

Then, $ALCD$ is a parallelogram

So, $AL = CD = 20$ cm and $CL = AD = 26$cm. **½**

In ΔCLB, we have

$CL = CB = 26$ cm

Therefore, ΔCLB, is an isosceles triangle. **½**

Draw altitude CM of ΔCLB, **½**

Since, ΔCLB, is an isosceles triangle.

So, CM is also the median.

Then, $LM = MB = \frac{1}{2}BL = \frac{1}{2} \times 20$ cm $= 10$ cm

$[as\ BL = AB - AL = (40-20)\ cm = 20\ cm]$.

Applying Pythagoras theorem in ΔCLM,

we have, $CL^2 = CM^2 + LW^2$

$26^2 = CM^2 + 10^2$

$CM^2 = 26^2 - 10^2$

$= (26-10)(26+10)$

$= 16 \times 36 = 576$

$CM = \sqrt{576} = 24$ cm **1**

Hence, the area of the trapezium $= \frac{1}{2} \times$ (sum of parallel sides) $\times$ Height

$= \frac{1}{2}(20+40) \times 24$

$= 30 \times 24 = 720\,cm^2$ **1**

26. Let the rational number be x

$\frac{5}{2}x + \frac{2}{3} = \frac{-7}{12}$ **1**

or, $\frac{5}{2}x = \frac{-7}{12} - \frac{2}{3}$

[Transposing $\frac{2}{3}$ to RHS]

or, $\frac{5}{2}x = \frac{-7-8}{12}$

or, $\frac{5}{2}x = \frac{-15}{12}$ **1**

or, $5x \times 12 = -15 \times 2$

or, $60x = -30$ [Dividing both sides by 60]

or, $x = \frac{-30}{60}$

or, $x = \frac{-1}{2}$ **1**

Hence, the required rational number is $\frac{-1}{2}$.

27. **(a)** Total outcomes of a spinning a wheel = 5
but a pointer stopping on D

Then, the probability $= \frac{1}{5}$

(b) There are 4 ace out of 52 cards.

Probability of getting ace $= \frac{4}{52} = \frac{1}{13}$

(c) Total number of apples = 7
Number of red apples = 4
Probability of getting a red apple

$= \frac{No.\ of\ red\ apples}{Total\ No.\ of\ apples} = \frac{4}{7}$ **4**

28. **(a)** $(a^2 - b^2)^2$

Use the identity,

$(a-b)^2 = a^2 - 2ab + b^2$

$= (a^2)^2 - 2a^2b^2 + (b^2)^2$

$= a^4 - 2a^2b^2 + b^4$

(b) $(2x + 5)^2 - (2x - 5)^2$

Use the identities,

$(a+b)^2 = a^2 + 2ab + b^2$

$(a-b)^2 = a^2 - 2ab + b^2$

$= \{(2x)^2 + 2(2x)(5) + (5)^2\} - (2x-5)^2$

$= \{4x^2 + 4x \times 5 + 25\} - \{(2x)^2 - 2(2x)(5) + (5)^2$

$= (4x^2 + 20x + 25 - (4x^2 - 20x + 25)$

$= 4x^2 + 20x + 25 - 4x^2 + 20x - 25$

$= 20x + 20x$

$= 40x$

(c) $(7m - 8n)^2 + (7m + 8n)^2 = \{(7m)^2 - 2(7m)$

$(8n) + (8n)^2\} + \{(7m)^2 + 2(7m)\ (8n) + (8n)^2\}$

$= 49m^2 - 112mn + 64n^2 + 49m^2 + 112mn + 64n^2$

$= 98m^2 + 128n^2$

(d) $(4m + 5n)^2 + (5m + 4n)^2$

Use the identity,

$(a+b)^2 = a^2 + 2ab + b^2$

$= \{(4m)^2 + 2(4m)\ (5n) + (5n)^2\} + \{(5m)^2 + 2\ (5m)(4n) + (4n)^2\} = (16m^2 + 40mn + 25n^2) + (25m^2 + 40mn + 16n^2)$

$= (16 + 25)m^2 + (40 + 40)mn + 125 + 16)n^2$

$= 41m^2 + 80mn + 41n^2$

29. **(a)** Compounded annually

P = Rs. 80000, $T = 1\frac{1}{2}$ year

R = 10% of p.a. and 5% of half years

$A = P\left(1 + \frac{R}{100}\right)^n$

$= 80000\left(1 + \frac{10}{100}\right)^1\left(1 + \frac{5}{100}\right)^1$

$= 80000\left(\frac{11}{10}\right)\left(\frac{21}{20}\right)$

A = Rs. 92400 **2**

(b) Compounded half yearly.

P = Rs. 80,000, R = 10%

$= \frac{10}{2} = 5\%$

$n = 1\frac{1}{2}$ year $= \frac{3}{2} \times 32 = 3$ half years

$A = P\left(1 + \frac{R}{100}\right)^n$

$= 80,000\left(1 + \frac{5}{100}\right)^3$

$A = 80,000\left(\frac{21}{20}\right)^3$

$= 80,000 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20}$

$A =$ Rs 92610

Difference in amounts = Rs. 92610 – Rs.92400

= Rs. 210 **2**

30. **(a)** $28x^4 \div 56x = \frac{28x^4}{56x}$

$= \frac{2 \times 2 \times 7 \times x \times x \times x \times x}{2 \times 2 \times 2 \times 7 \times x}$

$= \frac{x^3}{2}$ **1**

(b) $-36y^3 \div 9y^2 = \frac{-36y^3}{9y^2}$

$= \frac{-2 \times 2 \times 3 \times 3 \times y \times y \times y}{3 \times 3 \times y \times y}$

$= -4y$ **1**

(c) $66pq^2r^3 \div 11qr^2 = \frac{66pq^2r^3}{11qr^2}$

$= \frac{6 \times 11 \times p \times q \times q \times r \times r \times r}{11 \times q \times r \times r}$

$= 6pqr$

1

(d) $34x^3y^3z^3 \div 51xy^2z^3$

$= \frac{2 \times 17 \times x \times x \times x \times y \times y \times y \times z \times z \times z}{3 \times 17 \times x \times y \times y \times z \times z \times z}$

$= \frac{2x^2y}{3}$ **1**