

CBSE Board
Class VIII Mathematics

Time: 2 ½ hours

Total Marks: 80

General Instructions:

1. All questions are **compulsory**.
 2. **Section A** comprises of **12** questions carrying 1 mark each.
 3. **Section B** comprises of **12** questions carrying 2 marks each.
 4. **Section C** comprises of **8** questions carrying 3 marks each.
 5. **Section D** comprises of **5** questions carrying 4 marks each.
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Section A
(Questions 1 to 12 carry 1 mark each)

1. Equation $2x = 7 - \frac{3}{2}x$, with variables on one side can be expressed as
 - A. $\frac{1}{2}x = 7$
 - B. $\frac{7}{2}x = 7$
 - C. $7x = 7$
 - D. $2x = 7$
2. In the representation of rational numbers, the number line extends _____.
 - A. Indefinitely on both sides of 0
 - B. Indefinitely to the right side of zero
 - C. Indefinitely to the right side of 1
 - D. Indefinitely to the left side of zero
3. An octagon is made up of _____ sides.
 - A. 8
 - B. 10
 - C. 6
 - D. 5
4. If the cost of an item is increased from Rs 50 to Rs 55 then the percentage increase in cost is
 - A. 5%
 - B. 10%
 - C. 20%
 - D. 15%

5. The sum $1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17$ is
- 7^2
 - 8^2
 - 9^2
 - 10
6. The smallest number by which $(4)^2 \sqrt[3]{1000}$ must be divided to make it a perfect cube is _____.
- 20
 - 10
 - 5
 - 2
7. Which one of the following is not a parallelogram?
- Rhombus
 - Trapezium
 - Rectangle
 - Square

8. Number of Red Rome apple is

Varities of Apples in a food store	
Red Delicious	  
Golden Delicious	  
Red Rome	   
McIntosh	 
Jonathan	   

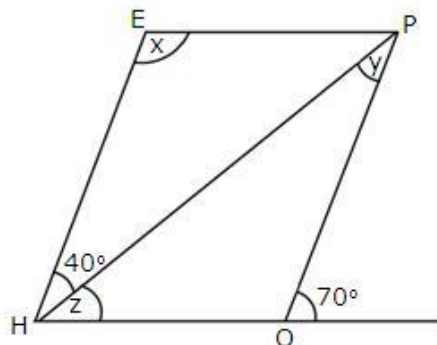
 = 10 apples

- 40
 - 45
 - 30
 - 35
9. In a parallelogram, if one angle is 50° , then its adjacent angle will be _____.
- 130°
 - 50°
 - 100°
 - 25°

10. The probability of an event always lies between ____ .
 A. 0 and 2
 B. 0 and 1
 C. 0 and $\frac{1}{2}$
 D. -1 and 1
11. Using the pattern, $2^2 = 4$
 $20^2 = 400$
 We get $2000^2 =$
 A. 40000
 B. 4000000
 C. 400000
 D. 40000000
12. A shopkeeper announces a stock clearance sale by giving a discount of 50% + 50%.
 If marked price of an article is Rs. 1200 then its sale price will be
 A. Rs 200
 B. Rs 350
 C. Rs 300
 D. Rs 400

Section B
(Questions 13 to 24 carry 2 marks each)

13. Find the multiplicative inverse of the following:
 (i) $\frac{-5}{8} \times \frac{-3}{7}$ (ii) $-1 \times \frac{-2}{5}$
14. In a two-digit number, the unit's digit is 7 more than the ten's digit. Sum of the digits is half of the whole number. Find the digits and number.
15. The given figure HOPE is a parallelogram. Find the angle measures x, y and z. Also, state the properties used.

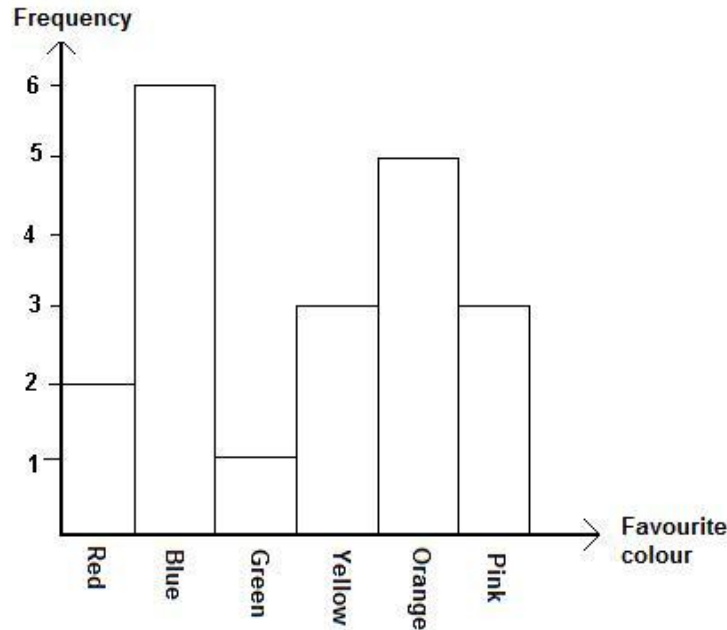


16. There are 35 students in a class, out of which 20 are boys and 15 are girls. From these students one is chosen at random. What is the probability that the chosen student is

- i) a boy
- ii) a girl

17. Find the square of the number 82 using the property $(a + b)^2 = a^2 + b^2 + 2ab$.

18. The given bar graph shows the favourite colours of 20 students in a class. How many more students favour orange colour than green?



19. The cost of a TV set at a showroom was Rs. 36500. The sales tax charged was 8%. Find the bill amount.

20. Write first 4 triangular numbers and verify that sum of two consecutive triangular numbers is a square number.

21. Solve for x:

$$3(2x - 1) = 2(x + 4) + 1$$

22. Square root of 18.5 lies between which numbers?

23. The number of students in a school is increased by 35%. If originally the number was 4000, then the number of students now is:

24. In a collection of 35 lotteries, there are 10 prizes and 25 blanks. A lottery is drawn at random. What is the probability of getting a prize?

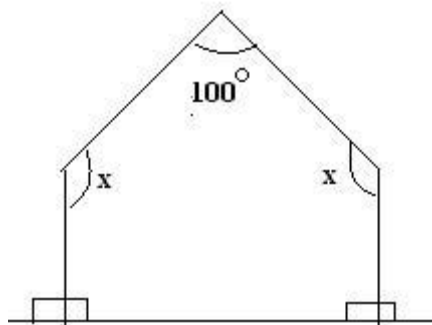
Section C
(Questions 25 to 32 carry 3 marks each)

25. The following table shows the number of visitors to a park for the months January to March.

Month	January	February	March
No. of Visitors	150	300	250

- Construct a bar graph representing the given data.
 - What is the percentage increase in visitors in March as compared to January?
 - What percentage of visitors came in February as compared with total number of visitors over the three months?
26. A shopkeeper sells one transistor for Rs. 840 at a gain of 20% and another for Rs. 960 at a loss of 4%. What is his total gain or loss percent?
27. Solve for x:
- $$\frac{x + 0.25}{3} - x = 0.5$$
28. Find the compound interest on Rs 5000 for 1 year at 8% per annum, compounded half-yearly.
29. Use the number line to work out -4×3 .
30. The denominator of a fraction is 1 more than double of the numerator. If both the numerator and denominator are increased by 4; the fraction becomes $\frac{3}{5}$, find the fraction.

31. Find x in the figure?



32. Construct a square whose side measure 4.7 cm. Write the steps of construction.

Section D
(Questions 33 to 37 carry 4 marks each)

33. Mr. Ranjan is seven times as old as his son. 10 years hence, he will be three times as old as his son. Find their ages.
34. Construct a parallelogram ABCD in which $AB = 6$ cm, $BC = 4.5$ cm and diagonal $AC = 6.8$ cm.
35. A man with a monthly salary of Rs. 10800 plans his budget for a month as given below:

Item	Food	Rent	Education	Savings	Misc
Amount	3150	2100	1950	2400	1200

Represent the above data by a pie chart.

36. The measures of two adjacent angles of a parallelogram are in the ratio 3 : 2. Find the measure of each of the angles of the parallelogram.
37. Is the number 2048 a perfect square? If not, then by which number should it be multiplied so as to get a perfect square?

**CBSE Board
Class VIII Mathematics
Solution**

Time: 2 ½ hours

Total Marks: 80

Section A

1. Correct answer: B

$$2x = 7 - \frac{3}{2}x$$

After transposing $-\frac{3}{2}x$ towards left hand side, we get

$$2x + \frac{3}{2}x = 7$$

$$\frac{2(2x) + (1 \times 3x)}{2} = 7$$

$$\frac{4x + 3x}{2} = 7$$

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

2. Correct answer: A

Indefinitely on both sides of 0

3. Correct answer: A

An octagon is made up of 8 sides.

4. Correct answer: B

Original Price = Rs. 50

Increased Price = 55 - 50 = 5

Thus, Percentage increase = $\left(\frac{\text{Increased price}}{\text{Original price}} \times 100 \right) \%$

$$\text{Percentage increase} = \frac{5}{50} \times 100 = 10\%$$

5. Correct answer: C

We know that the sum of first n odd natural numbers is n^2 .

Therefore,

$$1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 = 9^2$$

6. Correct answer: A

$$(4)^2 \sqrt[3]{1000} = 4 \times 4 \times 10 = 2 \times 2 \times 2 \times 2 \times 2 \times 5 = (2 \times 2 \times 2) \times 2 \times 2 \times 5$$

So, the given number must be divided by $2 \times 2 \times 5 = 20$ to make it a perfect cube.

7. Correct answer: B
Trapezium is not a parallelogram as it has only one pair of parallel sides.
8. Correct answer: A
Number of Red Rome apple = $4 \times 10 = 40$
9. Correct answer: A
It is known that the adjacent angles of a parallelogram are supplementary.
Therefore, measure of required angle = $180^\circ - 50^\circ = 130^\circ$
10. Correct answer: B
The probability of an event always lies between 0 and 1.
11. Correct answer: B
Using the given pattern,
 $2000^2 = 4000000$
12. Correct answer: C
The discount $50\% + 50\%$ is equal to a single discount of 75% .
The S.P. is 25% of C.P.
So, S.P. = $\frac{25}{100} \times 1200 = 300$

Section B

- 13.
- (i) Let x be the multiplicative inverse of $\frac{-5}{8} \times \frac{-3}{7}$

$$\therefore \frac{-5}{8} \times \frac{-3}{7} \times x = 1$$

$$\Rightarrow \frac{15}{56} \times x = 1 \Rightarrow x = \frac{56}{15}$$
- (ii) Let x be the multiplicative inverse of $-1 \times \frac{-2}{5}$
 So, $-1 \times \frac{-2}{5} \times x = 1 \Rightarrow \frac{2}{5} x = 1$
 Or, $x = \frac{5}{2}$

14. Let x be the ten's digit of the two-digit number.

Then its unit's digit = $x + 7$.

Number = unit's digit + 10(ten's digit) = $(x + 7) + 10(x) = 11x + 7$.

Sum of the digits = $(x + 7) + (x) = 2x + 7$.

Given, sum of the digits is half of the whole number. Therefore,

$$(2x + 7) = \frac{1}{2}(11x + 7)$$

$$4x + 14 = 11x + 7$$

$$4x - 11x = 7 - 14$$

$$-7x = -7$$

$$x = 1$$

Ten's digit of the two-digit number is $x = 1$.

Unit's digit of the two-digit number = $x + 7 = 1 + 7 = 8$

Thus, the required number is 18.

15. $y = \angle EHP$ (Alternate interior angles as $OP \parallel HE$)

$$y = 40^\circ$$

$$70^\circ = \angle EHO = z + 40^\circ \text{ (Corresponding angles as } OP \parallel HE)$$

$$70^\circ - 40^\circ = z$$

$$z = 30^\circ$$

$$\angle HEP = \angle EHO \text{ (Adjacent pair of angles as } HO \parallel EP)$$

$$x + (z + 40^\circ) = 180^\circ$$

$$x + 70^\circ = 180^\circ$$

$$x = 110^\circ$$

16. Total number of students = 35

i) Number of boys = 20

$$\therefore \text{Required probability} = \frac{20}{35} = \frac{4}{7}$$

ii) Number of girls = 15

$$\therefore \text{Required probability} = \frac{15}{35} = \frac{3}{7}$$

17. $82^2 = (80 + 2)^2$

In the property $(a + b)^2 = a^2 + b^2 + 2ab$

Substituting $a = 80$ and $b = 2$, we get

$$(80 + 2)^2 = 80^2 + 2^2 + 2 \times 80 \times 2$$

$$= 6400 + 4 + 320$$

$$= 6724$$

18. From the graph, it is clear that:

5 students favoured orange and 1 student favoured green colour.

Now, $5 - 1 = 4$

Therefore, 4 more students favoured orange colour than green.

19. Cost of TV set = Rs. 36500.

Sales tax = 8% of Rs. 36500

$$= \text{Rs} \left(36500 \times \frac{8}{100} \right)$$

$$= \text{Rs} 2920$$

Therefore, Bill amount = Rs. $(36500 + 2920) = \text{Rs. } 39420$

20. First four triangular numbers are: 1, 3, 6 and 10.

Now, $1 + 3 = 4 = 2^2$

$3 + 6 = 9 = 3^2$

$6 + 10 = 16 = 4^2$

Here, 4, 9 and 16 all are square numbers.

21. $3(2x - 1) = 2(x + 4) + 1$

$$6x - 3 = 2x + 8 + 1$$

$$6x - 3 - 2x = 8 + 1 \text{ (Transposing } 2x \text{ to LHS)}$$

$$6x - 2x = 8 + 1 + 3 \text{ (Transposing } -3 \text{ to RHS)}$$

$$4x = 12$$

Dividing both sides by 4,

$$x = \frac{12}{4} = 3$$

$$x = 3$$

22.

We know that $16 < 18.5 < 25$

Also, $4^2 = 16$ and $5^2 = 25$

$$\therefore \sqrt{16} < \sqrt{18.5} < \sqrt{25}$$

$$\Rightarrow 4 < \sqrt{18.5} < 5$$

Thus, the square root of 18.5 lies between 4 and 5.

23. Original number = 4000

Increased % = 35%

Thus, Number of students now = Original number + 35% of 4000

$$\begin{aligned}\text{Number of students} &= 4000 + \frac{35}{100} \times 4000 \\ &= 4000 + 1400 \\ &= 5400\end{aligned}$$

24. Here, $n(S) = 10 + 25 = 35$

Let E be the event of getting a prize.

$n(E) = 10$

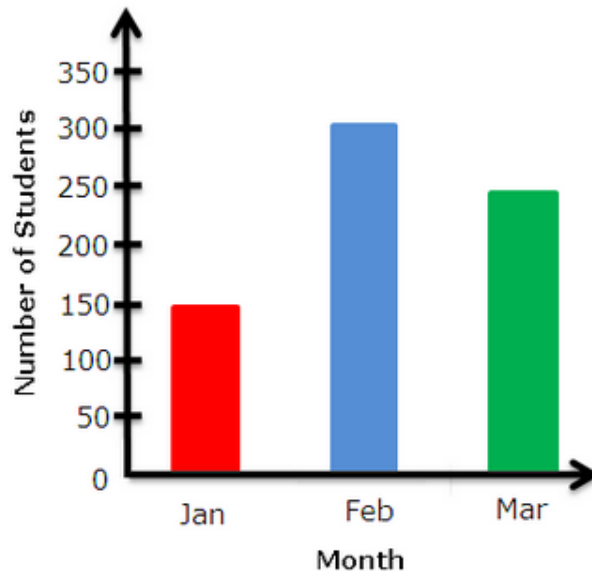
$$\Rightarrow P(E) = \frac{n(E)}{n(S)} = \frac{10}{35} = \frac{2}{7}$$

Probability of getting a prize = $\frac{2}{7}$

Section C

25.

- a) If we choose a scale of 1:50 for the frequency then the vertical bar chart will be as shown.



- b) Percentage increase in the visitors in March as compared to January is
$$\frac{250 - 150}{150} \times 100 = 66.67\%$$
- c) Percentage of visitors who came in February as compared to the total number of visitors is
$$\frac{300}{150 + 300 + 250} \times 100 = 42.86\%$$

$$26. \quad CP = \left(\frac{100}{100 + \text{gain}\%} \right) \times SP$$

Thus, CP of 1st transistor

$$= \left(\frac{100}{120} \times \text{Rs } 840 \right) = \text{Rs } 700$$

CP of 2nd transistor

$$= \left(\frac{100}{96} \times \text{Rs } 960 \right) = \text{Rs } 1000$$

So, total C.P. = Rs. (700 + 1000) = Rs. 1700.

Total S.P. = Rs. (840 + 960) = Rs. 1800.

Gain = Rs (1800 - 1700) = Rs 100

$$\therefore \text{Gain}\% = \left(\frac{100}{1700} \times 100 \right)\% = 5\frac{15}{17}\%$$

$$27. \quad \frac{x+0.25}{3} - x = 0.5$$

$$\frac{x+0.25}{3} - \frac{x}{1} = 0.5$$

LCM of 3 and 1 = 3

$$\frac{x+0.25-3x}{3} = 0.5$$

Multiplying both sides with 3, we get

$$0.25 - 2x = 0.5 \times 3$$

$$0.25 - 2x = 1.5$$

Transposing 0.25 to right hand side

$$-2x = 1.5 - 0.25$$

$$-2x = 1.25$$

$$x = -0.625$$

28. Rate of interest = 8% per annum = 4% per half year.

Time = 1 year = 2 half years.

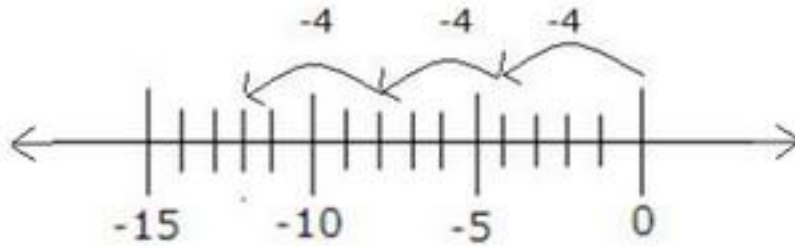
Principal = Rs 5000

Using compound interest formula, we have:

$$\begin{aligned} \text{Amount} &= P \left(1 + \frac{r/2}{100} \right)^{2n} \\ &= 5000 \left(1 + \frac{4}{100} \right)^2 \\ &= 5000 \times \frac{26}{25} \times \frac{26}{25} \\ &= \text{Rs } 5408 \end{aligned}$$

Therefore, compound interest = Rs (5408 - 5000) = Rs 408

29.



On the number line -4×3 means three jumps of 4 to left of 0.

By making three jumps of 4 we move 12 spaces to left of 0 and reach at the point -12.

Thus, $-4 \times 3 = -12$.

30.

Let the numerator be x .

Then, denominator will be $(1 + 2x)$.

According to the given information,

$$\frac{x + 4}{1 + 2x + 4} = \frac{3}{5}$$

$$\frac{x + 4}{2x + 5} = \frac{3}{5}$$

$$5x + 20 = 6x + 15$$

$$20 - 15 = 6x - 5x$$

$$x = 5$$

\therefore Numerator = 5 and denominator = $1 + 2x = 1 + 10 = 11$

Thus, the fraction is $\frac{5}{11}$

31. We know that the sum of the interior angles of a polygon of n sides is equal to $(2n - 4)$ right angles.

Therefore, sum of all interior angles of a pentagon is 540° .

$$x + 100^\circ + x + 90^\circ + 90^\circ = 540^\circ$$

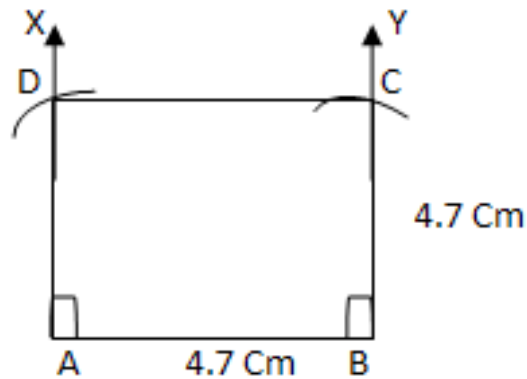
$$2x = 540^\circ - 280^\circ$$

$$x = \frac{260^\circ}{2} = 130^\circ$$

32. Steps of construction:

- a) Draw $AB = 4.7\text{cm}$.
- b) Draw $\angle XAB = 90^\circ$ and $\angle YBA = 90^\circ$.
- c) With A as centre and radius 4.7cm , draw an arc which cuts AX at D.
- d) With B as centre and radius 4.7cm , draw an arc which cuts BY at C.
- e) Join DC.

ABCD is the required square



Section D

33. Let the son's age be x years.

\therefore Mr. Ranjan's age is $7x$ years.

After 10 years, his son's age will be $= (x + 10)$ years

After 10 years, Mr. Ranjan's age will be $= (7x + 10)$ years

By the given condition,

$$(7x + 10) = 3(x + 10)$$

$$\Rightarrow 7x + 10 = 3x + 30$$

$$\Rightarrow 7x - 3x = 30 - 10$$

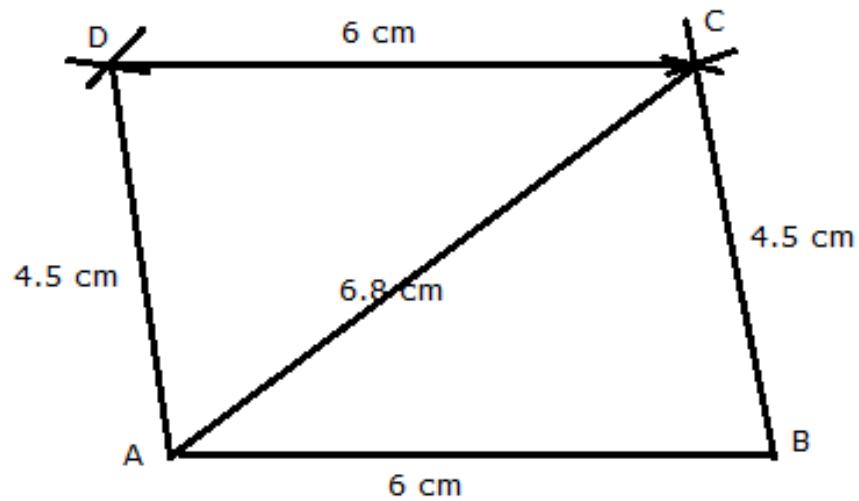
$$\Rightarrow 4x = 20 \text{ or } x = 5$$

\therefore Son's age is 5 years.

Mr. Ranjan's age is $7 \times 5 = 35$ years

34. Steps of Construction:

- (i) Draw $AB = 6$ cm.
 - (ii) With A as centre and radius 6.8 cm, draw an arc.
 - (iii) With B as centre and radius 4.5 cm draw another arc, cutting the previous arc at C.
 - (iv) Join BC and AC.
 - (v) With A as centre and radius 4.5 cm, draw an arc.
 - (vi) With C as centre and radius 6 cm draw another arc, cutting the previously drawn arc at D.
 - (vii) Join DA and DC.
- ABCD is the required parallelogram.



35. Total money = Rs. 10800

To work out the angle of each segment, work out the fraction of the total that each item got.

Start with food: $\frac{3150}{10800}$

There are 360° in a full turn, so to work out the angle, multiply the fraction by 360:

$$\frac{3150}{10800} \times 360^\circ = 105^\circ$$

The food sector has an angle of 105°

Repeat this process to find the angle of the segments for the other items.

Once you have calculated the angles of the segments, construct the pie chart

Item	Amount	Central Angle
Food	3150	$\frac{3150}{10800} \times 360^\circ = 105^\circ$
Rent	2100	$\frac{2100}{10800} \times 360^\circ = 70^\circ$
Education	1950	$\frac{1950}{10800} \times 360^\circ = 65^\circ$
Savings	2400	$\frac{2400}{10800} \times 360^\circ = 80^\circ$
Misc	1200	$\frac{1200}{10800} \times 360^\circ = 40^\circ$



36. Let the measures of two adjacent angles, $\angle A$ and $\angle B$, of parallelogram ABCD are in the ratio of 3 :2.

Let $\angle A = 3x$ and $\angle B = 2x$

We know that the sum of the measures of adjacent angles is 180° for a parallelogram.

$$\angle A + \angle B = 180^\circ$$

$$3x + 2x = 180^\circ$$

$$5x = 180^\circ$$

$$x = \frac{180}{5} = 36^\circ$$

$$\angle A = \angle C = 3x = 108^\circ \text{ (Opposite angles)}$$

$$\angle B = \angle D = 2x = 72^\circ \text{ (Opposite angles)}$$

Thus, the measures of the angles of the parallelogram are 108° , 72° , 108° and 72° .

37. We find the prime factors of 2048.

2	2048
2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$$\therefore 2048 = \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times 2$$

We find in the above prime factorisation, the number 2 does not make a pair, so 2048 is not perfect square.

If 2 gets a pair, then the number will becomes a perfect square. Thus, by multiplying the number by 2, we get a perfect square.

$$2048 \times 2 = 4096 \text{ is a perfect square.}$$

Hence, the required number which is to be multiplied with 2048 to get a perfect square is 2.