FA – II
Class – VIII
Mathematics

Chapter – 3

Squares and Square roots

Such numbers, which can be expressed as the product of two identical numbers are known as square numbers & these numbers are known as perfect squares.

Pythagorean Triplets.

If the sum of the squares of two numbers is equal to the square of third number, then the three numbers form a pythagorean triplet.

For example: $3^2+4^2 = 25$

& $5^2 = 25$

$\therefore$ 3, 4, 5 are pythagorean triplet.

For any natural no. $m > 1$, $2m$, m^2-1 & m^2+1 for a pythagorean triplet.

Ex – 3.1

Q(1) Write the squares of all the natural no. between 20 and 30.

$21^2 = 441$, $22^2 = 484$, $23^2 = 529$, $24^2 = 576$
$25^2 = 625$, $26^2 = 676$, $27^2 = 729$, $28^2 = 784$,
and $29^2 = 841$, $30^2 = 900$.

Q(2). Square of nos.

(i) $76^2 = (70+6)^2$

$= 70^2+6^2+2\times70\times6$

$= 4900+36+840.$

$= 5776.$

Similarly we can find the square of other nos.

Q(3) Write ones digit in the square of the following nos.

(a) 13

Solution. Since the square of 3 is 9.
So the ones digit of square of 13 is 9.
Similarly we can find other.

Q(4) How many non square no are there between 14^2 & 15^2

Solution $14+15-1 = 29-1$

$= 28$ nos

Similarly we can find other nos.

(5) (i) Sum of Consecutive odd nos of 10^2

$10^2 = 1+3+5+7+9+11+13+15+17+19$.

$12^2 = 1+3+5+7+9+11+13+15+17+19+21+23$

Similarly we can write other nos.

(6) square of following nos.

(a) $35^2 = 35 \times 35$

$= 1225$

Similarly we can find Others.

(7) Pythagorean triplets

$12^2 = 144$ & 5^2+10^2

$= 25+100 = 125$

$144 \neq 125$

So 5, 10, 12 are not Pythagorean trip

Similarly we can Post for Others.

(8) Find Pyth. triplet whose greatest no is 17

$m^2+1 = 17 \Rightarrow m^2 = 16$

$\Rightarrow m = 4$

So $2m = 2 \times 4 = 8$

& $m^2-1 = 4^2-1 = 15$

So pythagorean triplet is 8, 15 & 17.

(9) smallest member $2m = 22$

$m = 11$

∴ other nos 11^2-1 & 11^2+1

120 & 122.

(10)

solution $m^2-1 = 323$

$m^2 = 324$.

$m = \sqrt{324}$

$m = 18$

∴ other nos are $2m = 36$ & $18^2+1 = 325$

(11)

Solution Missing nos are

11115556, 111115556, 1111115556

Ex – 3.2

Q(1) Square root of following nos - - -.

Solution (a) 121.

$121-1 = 120$

$120-3 = 117$

$117-5 = 112$

$112-7 = 105$

$105-9 = 96$.

$96-11 = 85$

$85-13 = 72$

$72-15 = 57$

$57-17 = 40$

$40-19 = 21$

$21-21 = 0$.

∴

$\sqrt{121} = 11$ Ans.

Similarly we can find the square roots of other given nos.

Q. (2) Square root by prime factorisation.

(a) 1024

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

$1024 = 2\times2\times2\times2\times2\times2\times2\times2\times2\times2$

$= 2^2 \times 2^2 \times 2^2 \times 2^2 \times 2^2$

$\sqrt{1024} = 2\times2\times2\times2\times2$

$= 32$ Ans

Similarly we can find the square root of other given numbers.

Q(3) Find the least no ---

Solution: (a) 1260

2	1260
2	630
3	315
3	105
5	35
	7

$= 2\times2\times3\times3\times5\times7$

To get the perfect square we have to multiply by 35

$\sqrt{1260\times35} = \sqrt{2\times2\times3\times3\times5\times5\times7\times7} = 2\times3\times5\times7$

$= 210$ Ans

Contd. Ex. 3.2.

Q (4) Find least - - -

Solution :- (a) 1575

3	1575
3	525
5	175
5	35
7	7
	1

$1575 = 3 \times 3 \times 5 \times 5 \times 7$

7 comes one time in the factorisation of 1575 so divided by 7

$\therefore \frac{1575}{7} = 3 \times 3 \times 5 \times 5$

$\Rightarrow 225 = 3 \times 3 \times 5 \times 5$

$\sqrt{225} = 3 \times 5 = 15$

$\therefore$ Required no is 7 Ans.

o Remaing problems we can solve by same method.

(5) Which of the - - -

Solution : (1) If any no has odd no of zeros at the end then this no is not the perfect squar of any no

(2) If any no has 2, 3, 7, 8, at the unit place then it is not a perfect square.

So with the help of these statement we can find (a) (c) & (e) are not perfect square of any number.

(6) Find the Smallest - - -

Solution :- Lcm of 9, 15 & 20

$= 2 \times 2 \times 3 \times 3 \times 5$

$= 180.$

2	9, 15, 20
2	9, 15, 10
3	9, 15, 5
3	3, 5, 5
5	1, 5, 5
	1, 1, 1

$180 = 2\times2\times3\times3\times5$

$180\times5 = 2\times2\times3\times3\times5\times5$

$900 = 30^2$

$\therefore \sqrt{900} = 30.$

Ans:- The required no is 900 & $\sqrt{900} = 30$

Ex-3.3.

Q(1) Find the square root by division Method.

Solution :- (a) 2116.

	46
4	2116
4	16
86	516
	516
	00.

$\therefore \sqrt{2116} = 46.$

Similarly we can find the square root of other given nos.

(2) Find the square root - - - :- 37.4

(a) 1398.76

	37.4
3	1398.76
3	9
67	498
7	469.
744	2976
	2976
	0.

$\sqrt{1398.76} = 37.4.$ Ans

By using same method we can find the square root of other decimal nos.

(3) What is least no. that should - - - - - - -

Solution:-

	82.
8	6750
8	64
162	350
	324.
	26

26 should be subtracted from 6750. to get the perfect square.

$\therefore 6750 - 26 = 6724.$

$\sqrt{6724} = 82.$

By using same method we can find the required nos for other given nos.

(4) What is the least ----

(a) 3830.

∴ 3830 is not the perfect square of any no to get perfect square. we have to add 14.

	62
6	3830
6	36
122	230
	244.
	-14.

∴ so 3830 + 14 = 3844 which is the perfect square of 62.

Ans:- The required no is 14.

Similarly, by using same method, we can find the required no. for other given no.

Chapter - 4.

Cubes & Cube roots.

Cube of a number is obtained when a number is multiplied three times by itself.

Exercise - 4.1.

(1) Find the cubes ----

(a) $(-10)^3 = -10 \times -10 \times 10$

$= -1000$.

Similarly we can find the cube of other given nos.

(2) Find the value of

(a) $11^3 - 10^3$

$= 1 + 3 \times 11 \times 10$.

$= 1 + 330$

$= 331$.

If a & b are two consecutive nos then.

$b^3 - a^3 = 1 + 3ab$.

by using this formula. we can find the diff. of cube of two nos.

(3) Express each of the following.....

(a) $12^3 = 133 + 135 + 137 + 139 + 141 + 143 + 145 + 147 + 149 + 151 + 153 + 155$

(12 numbers started from 133).

(b) $10^3 = 91 + 93 + 95 + 97 + 99 + 101 + 103 + 105 + 107 + 109$

(c) $8^3 = 57 + 59 + 61 + 63 + 65 + 67 + 69 + 71$.

(4) $13^3 = 13 \times 13 \times 13$

$= 169 \times 13$

$= 2197$

$= 3 \times 732 + 1$.

$= 3n + 1$

Contd. Q 4. Ex. 4.1

$17^3 = 17 \times 17 \times 17$

$= 4913$

$= 3 \times 2456 + 1$

$= 3m + 1$

Q(5) Find the Smallest number - - - -

- - -

(a) $2808 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 13$

In the factorisation of 2808 we get 13 one time.

So

multiply 13×13 we will get

$2808 \times 169 = 2^3 \times 3^3 \times 13^3$.

$= (2 \times 3 \times 13)^3$

2	2808
2	1404
2	702
By 3	351
3	117
3	39
13	13
	1

The required no is $13 \times 13 = 169$.

∴

Using Same Method.

Similarly we can find the required no for other given no.

(6) Find the Smallest number - - - -

- - -

(a) $7875 = 3 \times 3 \times 5 \times 5 \times 5 \times 7$

In the factorisation of 7875 we get 3 comes two times 7 comes 1 time. So the required no is $3 \times 3 \times 7 = 63$.

∴ divided by 63 to get a perfect cube of number.

3	7875
3	2625
5	875
5	175
5	35
7	7
	1

Similarly we Solve the other remaing questions.

Exercise - 4.2.

Q(1) Find the cuberoot ....

Solution (a) 91125

$= 3\times3\times3\times3\times3\times3\times5\times5\times5$

$= 3^3 \times 3^3 \times 5^3$

$91125 = (3\times3\times5)^3$

$\sqrt[3]{91125} = \sqrt[3]{(3\times3\times5)^3}$

$= 3\times3\times5$

$= 45$

3	91125
3	30375
3	10125
3	3375
3	1125
3	375
5	125
5	25
	5

Similarly we can find the cuberoot of other given numbers.

(2) Find cube-root by Estimation Method.

(a) 17576

Solution:- Form groups of three starting from the rightmost digit of 17576

first group = 576

second group = 17

Consider the first group 576.

The ones digit is 6. so the required cube root of the given no ends with 6 in its one place.

Now take the next group. 17

Cube of 2 is 8 and cube of 3 is 27

∴ 17 lies between 8 & 27

We take the smaller number amongst 2 and 3 for the tens place of the required no.

∴ $\sqrt[3]{17576} = 26$. Ans

By using same method we can find the cube root of other given numbers.

Chapter – 11

Direct and Inverse Proportions.

If the value of x increases, the value of y is also increases such that the ratio $\frac{x}{y}$ remains constant. then we can say that x & y are directly proportional or $\frac{x}{y} = K \Rightarrow x = Ky$.

Exercise – 11.1.

(1) In the following tables, find whether x & y are directly proportional or not.

(a) Solution $\frac{x_1}{y_1} = \frac{8}{10} = \frac{4}{5}$ $\quad \frac{x_4}{y_4} = \frac{24}{30} = \frac{4}{5}$

$\frac{x_2}{y_2} = \frac{12}{15} = \frac{4}{5}$ $\quad \frac{x_5}{y_5} = \frac{28}{35} = \frac{4}{5}$

$\frac{x_3}{y_3} = \frac{20}{25} = \frac{4}{5}$

Since $\frac{x}{y} = \frac{4}{5} = K$.

$\therefore$ x & y are directly proportional.

Similarly we can prove other two questions.

Q.(2) If x & y are directly proportional find a, b, c, d & e.

Solution :– Since x & y are directly proportional

so $\frac{x_4}{y_4} = K \Rightarrow \frac{6}{42} = K = \frac{1}{7} = K$

$\therefore \frac{9}{a} = K = \frac{1}{7} \Rightarrow \frac{9}{a} = \frac{1}{7} \Rightarrow a = 9 \times 7 = 63$

$\frac{b}{126} = K = \frac{1}{7} \Rightarrow 7b = 126 \Rightarrow b = \frac{126}{7} = 18$.

$\frac{c}{630} = \frac{1}{7} \Rightarrow 7c = 630 \Rightarrow c = \frac{630}{7} = 90$

$\frac{42}{d} = \frac{1}{7} \Rightarrow d = 42 \times 7 = 294$

$$\frac{e}{35} = \frac{1}{7} \Rightarrow 7e = 35 \Rightarrow e = \frac{35}{7} \Rightarrow e = 5$$

Ans :- $a = 63$, $b = 18$, $c = 90$, $d = 294$, $e = 5$

Similarly we can solve other question.

(3) The cost of 3 metres of cloth - - - -

- - - -

Solution.

Length of cloth (m)	3	17
Cost (₹)	168	x

Let the cost of 17 m of cloth is ₹ x.

Since length of cloth is increase the cost is also increase so this is direct variation.

$$\therefore \frac{x_1}{y_1} = \frac{x_2}{y_2}$$

$$\Rightarrow \frac{3}{168} = \frac{17}{x} \Rightarrow 3x = 17 \times 168$$

$$x = \frac{17 \times 168}{3} = 56.$$

$$= ₹ 952$$

Ans :- The cost of 17 m of cloth is ₹ 952.

By using same method we can solve the other problems from 4th to 16th.

Exercise - 11.2.

(1) Check if x & y are inversely proportional or not.

x	2	3	4	6	12
y	78	52	39	26	13

Solution:-

Inverse proportion $xy = K$.

$x_1y_1 = 2 \times 78 = 156$

$x_2y_2 = 3 \times 52 = 156$.

etc. Since $xy = 156 = k$.

So x & y are inversely proportion.

Similarly we can proove other three question.

(2) If x & y are inversely proportion. Complete the table.

x	3	b	1	25
y	a	5	c	15

Solution:- Since x & y are inversely proportion.

So $xy = K$.

$\therefore K = 25 \times 15 = 375$

$\therefore 3 \times a = 375$

$a = \frac{375}{3} = 125$

$b \times 5 = k = 375$

$b = \frac{375}{5} = 75$

$1 \times c = 375$

$\Rightarrow c = 375$

Ans:- $a = 125$ $b = 75$ & $c = 375$

By using same method we can solve other problem.

(3) In an army camp - - - -

- - - -

Solution:- Let the required no of days be x.

No of men	45	27
no of days	30	x

Since If the no of men increase the provision for food will decrease.

So it is Inverse proportion.

$\therefore \quad x_1y_1 = x_2y_2$

$45 \times 30 = 27 \times x$

$x = \frac{45 \times 30}{27}$

$x = 50$

$\therefore$ no of days $= 50$

By using same method we can solve the remaining problems from 4th to 11.

Exercise - 11.3.

(1) A takes 30 days to complete a job - - -

Solution:- Since A takes 30 days to complete the work
So 1 day work of A = $\frac{1}{30}$ part of the work
& one day work of B = $(\frac{1}{20})$th part of work,

one day work of A & B = $\frac{1}{20} + \frac{1}{30}$

$= \frac{3+2}{60} = \frac{5}{60} = \frac{1}{12}$

∴ A & B can complete the work in $\frac{1}{1/12}$ days
= 12 days.

(2) A can do a - - - -

Solution: A can do a piece of work in 12 days.
So one day work of A = $\frac{1}{12}$th part of work.
One day work of B = $\frac{1}{15}$
let C alone can finish the work in x days.
∴ one day work of C = $\frac{1}{x}$ part of the work.

Now one day work of A, B & C = $\frac{1}{12} + \frac{1}{15} + \frac{1}{x}$,

$= \frac{1}{5}$

$\frac{1}{x} = \frac{1}{5} - \frac{1}{12} - \frac{1}{15}$

$\frac{1}{x} = \frac{12-5-4}{60} = \frac{3}{60}$ 20.

∴ x = 20 days.

Ans:- C alone can complete the work in 20 days.

Q(3) In one hour pipe A can fill $\frac{1}{15}$ part of tank.
—11— B can fill $\frac{1}{10}$ part of the tank.
—11— C —11— $\frac{1}{6}$ part of the tank.

In 1 hour All the three pipes A, B, C can fill $\left(\frac{1}{15}+\frac{1}{10}+\frac{1}{6}\right)$ part of the tank

$$= \frac{4+6+10}{60}$$

$$= \frac{20}{60} = \frac{1}{3} \text{ part of the tank.}$$

∴ $\frac{1}{3}$ part of the tank can fill in 1 hour.

So 1 part of the tank —11— in $\frac{1}{\frac{1}{3}} = 3$ hours.

Ans:- All the three pipes can fill the tank in 3 hours.

(4) In one hour A & B pipes can fill $\frac{5}{48}$ part of the pool.
In one hour A can fill $\frac{1}{16}$ part of the pool.
Let pipe B alone can fill the tank in x hours.
∴ In 1 hour Pipe B can fill $\frac{1}{x}$ part of the pool.

$$\therefore \frac{1}{x}+\frac{1}{16} = \frac{5}{48}$$

$$\frac{1}{x} = \frac{5}{48} - \frac{1}{16}$$

$$\frac{1}{x} = \frac{5-3}{48} = \frac{2}{48} = \frac{1}{24}.$$

$$\Rightarrow x = 24 \text{ hours.}$$

Ans:- B alone can fill the tank in 24 hours.
Q(5) Using same method we can solve Q.5.

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