

EXERCISE 5A

1. Find the value of:

(i) 6^2

(ii) 7^3

(iii) 4^4

(iv) 5^5

(v) 8^3

(vi) 7^5

Solution:

(i) 6^2

It can be written as

$$= 6 \times 6$$

$$= 36$$

(ii) 7^3

It can be written as

$$= 7 \times 7 \times 7$$

$$= 343$$

(iii) 4^4

It can be written as

$$= 4 \times 4 \times 4 \times 4$$

$$= 256$$

(iv) 5^5

It can be written as

$$= 5 \times 5 \times 5 \times 5 \times 5$$

$$= 3125$$

(v) 8^3

It can be written as

$$= 8 \times 8 \times 8$$

$$= 512$$

(vi) 7^5

It can be written as

$$= 7 \times 7 \times 7 \times 7 \times 7$$

$$= 16807$$

2. Evaluate:

(i) $2^3 \times 4^2$

(ii) $2^3 \times 5^2$

(iii) $3^3 \times 5^2$

(iv) $2^2 \times 3^3$

(v) $3^2 \times 5^3$

(vi) $5^3 \times 2^4$

(vii) $3^2 \times 4^2$

(viii) $(4 \times 3)^3$

(ix) $(5 \times 4)^2$

Solution:

(i) $2^3 \times 4^2$

It can be written as

$$= 2 \times 2 \times 2 \times 4 \times 4$$

On further calculation

$$= 8 \times 16$$

$$= 128$$

(ii) $2^3 \times 5^2$

It can be written as

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

On further calculation

$$= 8 \times 25$$

$$= 200$$

(iii) $3^3 \times 5^2$

It can be written as

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

On further calculation

$$= 27 \times 25$$

$$= 675$$

(iv) $2^2 \times 3^3$

It can be written as

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

On further calculation

$$= 4 \times 27$$

$$= 108$$

(v) $3^2 \times 5^3$

It can be written as

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

On further calculation

$$= 9 \times 125$$

$$= 1125$$

(vi) $5^3 \times 2^4$

It can be written as

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

On further calculation

$$= 125 \times 16$$

$$= 2000$$

(vii) $3^2 \times 4^2$

It can be written as

$$= 3 \times 3 \times 4 \times 4$$

On further calculation

$$= 9 \times 16$$

$$= 144$$

(viii) $(4 \times 3)^3$

It can be written as

$$= 4 \times 4 \times 4 \times 3 \times 3 \times 3$$

On further calculation

$$= 64 \times 27$$

$$= 1728$$

(ix) $(5 \times 4)^2$

It can be written as

$$= 5 \times 5 \times 4 \times 4$$

On further calculation

$$= 25 \times 16$$

$$= 400$$

3. Evaluate:

(i) $(3/4)^4$

(ii) $(-5/6)^5$

(iii) $(-3/-5)^3$

Solution:

(i) $(3/4)^4$

It can be written as

$$= (3/4) \times (3/4) \times (3/4) \times (3/4)$$

On further calculation

$$= (3 \times 3 \times 3 \times 3) / (4 \times 4 \times 4 \times 4)$$

$$= 81/256$$

(ii) $(-5/6)^5$

It can be written as

$$= (-5/6) \times (-5/6) \times (-5/6) \times (-5/6) \times (-5/6)$$

On further calculation

$$= [(-5) \times (-5) \times (-5) \times (-5) \times (-5)] / (6 \times 6 \times 6 \times 6 \times 6)$$

$$= -3125/776$$

(iii) $(-3/-5)^3$

It can be written as

$$= (-3/-5) \times (-3/-5) \times (-3/-5)$$

On further calculation

$$= [(-3) \times (-3) \times (-3)] / [(-5) \times (-5) \times (-5)]$$

$$= 27/125$$

4. Evaluate:

(i) $(2/3)^3 \times (3/4)^2$

(ii) $(-3/4)^3 \times (2/3)^4$

(iii) $(3/5)^2 \times (-2/3)^3$

Solution:

(i) $(2/3)^3 \times (3/4)^2$

It can be written as

$$= (2/3) \times (2/3) \times (2/3) \times (3/4) \times (3/4)$$

On further calculation

$$= 8/27 \times 9/16$$

$$= 1/6$$

(ii) $(-3/4)^3 \times (2/3)^4$

It can be written as

$$= (-3/4) \times (-3/4) \times (-3/4) \times (2/3) \times (2/3) \times (2/3) \times (2/3)$$

On further calculation

$$= -27/64 \times 16/81$$

$$= -1/12$$

(iii) $(3/5)^2 \times (-2/3)^3$

It can be written as

$$= (3/5) \times (3/5) \times (-2/3) \times (-2/3) \times (-2/3)$$

On further calculation

$$= 9/25 \times (-8/27)$$

$$= -8/75$$

5. Which is greater:

(i) 2^3 or 3^2

(ii) 2^5 or 5^2

(iii) 4^3 or 3^4

(iv) 5^4 or 4^5

Solution:

(i) 2^3 or 3^2

It can be written as

$$2^3 = 2 \times 2 \times 2 = 8$$

$$3^2 = 3 \times 3 = 9$$

Hence, 9 is greater than 8 i.e. $3^2 > 2^3$.

(ii) 2^5 or 5^2

It can be written as

$$2^5 = 2 \times 2 \times 2 \times 2 \times 2 = 32$$

$$5^2 = 5 \times 5 = 25$$

Hence, 32 is greater than 25 i.e. $2^5 > 5^2$.

(iii) 4^3 or 3^4

It can be written as

$$4^3 = 4 \times 4 \times 4 = 64$$

$$3^4 = 3 \times 3 \times 3 \times 3 = 81$$

Hence, 81 is greater than 64 i.e. $3^4 > 4^3$.

(iv) 5^4 or 4^5

It can be written as

$$5^4 = 5 \times 5 \times 5 \times 5 = 625$$

$$4^5 = 4 \times 4 \times 4 \times 4 \times 4 = 1024$$

Hence, 1024 is greater than 625 i.e. $4^5 > 5^4$.

6. Express each of the following in exponential form:

(i) 512

(ii) 1250

(iii) 1458

(iv) 3600

(v) 1350

(vi) 1176

Solution:

(i) 512

It can be written as

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

So we get

$$512 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^9$$

(ii) 1250

It can be written as

2	1250
5	625
5	125
5	25
5	5
	1

So we get

$$1250 = 2 \times 5 \times 5 \times 5 \times 5 = 2 \times 5^4$$

(iii) 1458

It can be written as

2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

So we get

$$1458 = 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 2 \times 3^6$$

(iv) 3600

It can be written as

2	3600
2	1800
2	900
2	450
3	225
3	75
5	25
5	5
	1

So we get

$$3600 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5 = 2^4 \times 3^2 \times 5^2$$

(v) 1350

It can be written as

2	1350
3	675
3	225
3	75
5	25
5	5
	1

So we get

$$1350 = 2 \times 3 \times 3 \times 3 \times 5 \times 5 = 2 \times 3^3 \times 5^2$$

(vi) 1176

It can be written as

2	1176
2	588
2	294
3	147
7	49
7	7
	1

So we get

$$1176 = 2 \times 2 \times 2 \times 3 \times 7 \times 7 = 2^3 \times 3 \times 7^2$$

7. If $a = 2$ and $b = 3$, find the value of:

(i) $(a + b)^2$

(ii) $(b - a)^3$

(iii) $(a \times b)^a$

(iv) $(a \times b)^b$

Solution:

(i) $(a + b)^2$

By substituting the values of a and b

$$= (2 + 3)^2$$

On further calculation

$$= 5^2$$

$$= 5 \times 5$$

$$= 25$$

(ii) $(b - a)^3$

By substituting the values of a and b

$$= (3 - 2)^3$$

On further calculation

$$= 1^3$$

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

$$= 1$$

(iii) $(a \times b)^a$

By substituting the values of a and b

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

On further calculation

$$= 6^2$$

$$= 6 \times 6$$

$$= 36$$

(iv) $(a \times b)^b$

By substituting the values of a and b

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

On further calculation

$$= 6^3$$

$$= 6 \times 6 \times 6$$

$$= 216$$

8. Express:

(i) 1024 as a power of 2.

(ii) 343 as a power of 7.

(iii) 729 as a power of 3.

Solution:

(i) 1024 as a power of 2.

It can be written as

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

So we get

$$1024 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^{10}$$

(ii) 343 as a power of 7.

It can be written as

7	343
7	49
7	7
	1

So we get

$$343 = 7 \times 7 \times 7 = 7^3$$

(iii) 729 as a power of 3.

It can be written as

3	729
3	243
3	81
3	27
3	9
3	3
	1

So we get

$$729 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 3^6$$

9. If $27 \times 32 = 3^x \times 2^y$; find the values of x and y.

Solution:

It is given that

$$27 \times 32 = 3^x \times 2^y$$

So we get

$$27 = 3^x$$

3	27
3	9
3	3
	1

Here

$$27 = 3 \times 3 \times 3 = 3^3 = 3^x$$

We get

$$x = 3$$

Similarly

$$32 = 2^y$$

2	32
2	16
2	8
2	4
2	2
	1

Here

$$32 = 2 \times 2 \times 2 \times 2 \times 2 = 2^5 = 2^y$$

We get

$$y = 5$$

10. If $64 \times 625 = 2^a \times 5^b$; find: (i) the values of a and b. (ii) $2^b \times 5^a$.

Solution:

(i) the values of a and b

It is given that

$$64 \times 625 = 2^a \times 5^b$$

We know that

$$64 = 2^a$$

2	64
2	32
2	16
2	8
2	4
2	2
	1

We can write it as

$$64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

So we get

$$64 = 2^6$$

$$a = 6$$

Similarly

$$625 = 5^b$$

5	625
5	125
5	25
5	5

1

We can write it as

$$625 = 5 \times 5 \times 5 \times 5$$

So we get

$$625 = 5^4$$

$$b = 4$$

(ii) $2^b \times 5^a$

Substituting the values of a and b

$$= 2^4 \times 5^6$$

It can be written as

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

So we get

$$= 16 \times 15625$$

$$= 250000$$

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