APPOLO STUDY CENTRE

SIMPLIFICATION WORK SHEET

BOOK SOURCE SPLIT UP

TITLE	STD	NEW OLD	TERM	Exercise
Simplification	6	NEW	1	1.3
	7	OLD	1	1.1 to 1.8
	7	NEW	1	1.1 to 1.6
	8	OLD	1	1.1, 1.2, 1.3
	8	NEW	1	1.1, 1.2
	9	OLD		2.2
	9	NEW	2	3.2
	10	OLD		3.11
	10	NEW		3.4, 3.5, 3.6
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Important Formula :

1. $(a+b)^2 = a^2 + b^2 + 2ab$
2. $(a - b)^2 = a^2 + b^2 - 2ab$
3. $a^2 - b^2 = (a + b)(a - b)$
4. $(a + b)^2 - (a - b)^2 = 4ab$
5. $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$
6. $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
7. $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
8. $a^m \times a^n = a^{m+n}$
9. $\frac{a^m}{a^n} = a^{m-n}$
10. $(a \times b)^n = a^n \times b^n$
11. $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$
12. $\sqrt{a/b} = \frac{\sqrt{a}}{\sqrt{b}}$
13. $\sqrt{x} = x^{1/2}$
14. $\sqrt[3]{x} = x^{1/3}$
15. $\sqrt[n]{x} = x^{1/n}$
16. $a^o = 1$ (where $a \neq o$)
17. $a^{-n} =$
18. $a^{m/n} = \sqrt[n]{a^m}$
19. $\left(\sqrt[n]{a}\right)^n = \left(a^{1/n}\right)^n = a$
20. $\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$
21. $\sqrt[n]{a/b} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$
22. $\left(\sqrt[n]{a}\right)^m = \sqrt[n]{a^m}$
23. $\sqrt[m]{\sqrt[n]{a}} = \sqrt[mn]{a} = \sqrt[n]{\sqrt[m]{a}}$

24. $(a - b - c)^2 = a^2 + b^2 + c^2 - 2ab + 25.$ $(a + b)^2 + (a - b)^2 = 2(a^2 + b^2)$ $2bc - 2ca$

BODMAS Rule :

BODMAS

B Bracket

O of

D Division

M Multiplication

A Addition

S Subtraction

Modulus of a Real number :

Modulus of a real number a is defined as

$$|a| = \begin{cases} a \text{ if } a > o \\ -a, \text{ if } a < o) \end{cases}$$

thus $|7| = 7$; and $|-7| = 7$

26. $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

27. $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

28. $(a - b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

$x + \frac{1}{x} = a$; then

i. $x^2 + \frac{1}{x^2} = a^2 - 2$ ii. $x^3 + \frac{1}{x^3} = a^3 - 3a$

iii. $x - \frac{1}{x} = \sqrt{a^2 - 4}$ iv. $x^4 + \frac{1}{x^4} = (a^2 - 2)^2 - 2$

v. $x^5 + \frac{1}{x^5} = (a^2 - 2)(a^3 - 3a) - a$ vi. $x^6 + \frac{1}{x^6} = (a^3 - 3a)^2 - 2$

Virnaculum (or) BAR:

When an expression contains virnaculum, before applying the 'BODMAS' Rule, we simplify the expression under the virnaculum.

Level – I

1. $108 \div 36$ of $\frac{1}{4} + \frac{2}{5} \times 3\frac{1}{4}$

a. $\frac{3}{4}$ b. $1\frac{1}{20}$ c. $13\frac{3}{10}$ d. $12\frac{13}{10}$

2. $2 - [2 - \{(2 - 2)(2 + 2)\}] = ?$

a. -4 b. 4 c. 6 d. none of these

3. $\frac{180\times15-12\times20}{140\times8+2\times55}=?$

a. $\frac{1}{7}$ b. $\frac{4}{5}$ c. 2 d. 4

4. $5\ \frac{5}{6}-3\ \frac{8}{9}-?=1$

a. $\frac{2}{3}$ b. $\frac{3}{2}$ c. $\frac{17}{18}$ d. 3

5. $\frac{3}{5}$ of $\frac{4}{7}$ of $\frac{5}{9}$ of $\frac{21}{24}$ of 504

a. 63 b. 69 c. 96 d. 84

6. By how much is three fifth of 350 greater than $\frac{4}{7}$ of 210

350 இல் ஐந்தில் மூன்று பங்கு ஆனது 210 ல் $\frac{4}{7}$ என்பதை விட எவ்வளவு அதிகம்?

a. 90 b. 110 c. 120 d. 210

7. What is the value of $\frac{(P+Q)}{(P-Q)}$ if $\frac{P}{Q}=7$

$\frac{P}{Q}=7$ எனில் $\frac{(P+Q)}{(P-Q)}$ ன் மதிப்பு?

a. $\frac{1}{3}$ b. $\frac{2}{3}$ c. $\frac{4}{3}$ d. $\frac{7}{8}$

8. $\frac{a}{b}=\frac{4}{3}$, then the value of $\frac{6a+4b}{6a-5b}$

$\frac{a}{b}=\frac{4}{3}$, எனில் $\frac{6a+4b}{6a-5b}$ ன் மதிப்பு

a. -1 b. 3 c. 4 d. 5

9. $\frac{a}{b}=\frac{4}{5}$ and $\frac{b}{c}=\frac{15}{16}$ then $\frac{c^2-a^2}{c^2+a^2}$ is

$\frac{a}{b}=\frac{4}{5}$; $\frac{b}{c}=\frac{15}{16}$ எனில் $\frac{c^2-a^2}{c^2+a^2}$ ன் மதிப்பு?

a. $\frac{1}{7}$ b. $\frac{7}{25}$ c. $\frac{3}{4}$ d. none of these

10. $(0.000729)^{-3/4}\times(0.09)^{-3/4}$

a. $\frac{10^3}{3^3}$ b. $\frac{10^5}{3^5}$ c. $\frac{10^2}{3^2}$ d. $\frac{10^6}{3^6}$

Level – II

11. Find the value of $\sqrt{3\sqrt{3\sqrt{3...}}}$

a. 3^1 b. 3^2 c. 3^3 d. 3^4

மதிப்பு காண்க: $\sqrt{3\sqrt{3\sqrt{3...}}}$

a. 3^1 b. 3^2 c. 3^3 d. 3^4

12. simplify: $\frac{(561\times561)-(31\times31)}{530}$

சுருக்குக: $\frac{(561\times561)-(31\times31)}{530}$

a. 530 b. 561 c. 31 × 31 d. 592

13. simplify: $\frac{\sqrt[3]{729}-\sqrt[3]{27}}{\sqrt[3]{512}+\sqrt[3]{343}}$

சுருக்குக: $\frac{\sqrt[3]{729}-\sqrt[3]{27}}{\sqrt[3]{512}+\sqrt[3]{343}}$

a. $\frac{2}{5}$ b. $6/20$ c. $6/4$ d. $5/2$

14. If 4x + 5y = 83; and $\frac{3x}{2y}=\frac{21}{22}$, then y – x = ?

4x + 5y = 83 மற்றும் $\frac{3x}{2y}=21/22$ எனில் y – x ன் மதிப்பு?

a. 3 b. 4 c. 7 d. 11

15. $\left(999\frac{1}{7}+999\frac{2}{7}+999\frac{3}{7}+999\frac{4}{7}+999\frac{5}{7}+999\frac{6}{7}\right)$ is simplified to

சுருக்குக: $\left(999\frac{1}{7}+999\frac{2}{7}+999\frac{3}{7}+999\frac{4}{7}+999\frac{5}{7}+999\frac{6}{7}\right)$

a. 2997 b. 5979 c. 5994 d. 5997

16. When $\left(2\sqrt{5}-\sqrt{2}\right)^2$ is simplified, we get

$\left(2\sqrt{5}-\sqrt{2}\right)^2$ இதன் சுருங்கிய வடிவம்

a. $4\sqrt{5}+2\sqrt{2}$ b. $22-4\sqrt{10}$ c. $8-4\sqrt{10}$ d. $2\sqrt{10}-2$

17. $0.\overline{34}+0.3\overline{4}$ =

a. $0.68\overline{7}$ B. $0.\overline{68}$ C. $0.6\overline{8}$ d. $0.68\overline{7}$

18. x = $\sqrt{5}+2$ then find the value of $x^2+\frac{1}{x^2}$

x = $\sqrt{5}+2$ எனில் $x^2+\frac{1}{x^2}$ ன் மதிப்பை காண்க.

a. 23 b. 21 c. 18 d. 29

19. simplify: $2\sqrt{72}\times5\sqrt{32}\times3\sqrt{50}$

சுருக்குக: $2\sqrt{72}\times5\sqrt{32}\times3\sqrt{50}$

a. $30\sqrt{115200}$ b. $7200\sqrt{2}$ c. $14400\sqrt{2}$ d. none of these

20. Find the value of $4-\cfrac{5}{1+\cfrac{1}{3+\cfrac{1}{2+\frac{1}{4}}}}$

a. $\frac{1}{8}$ b. $\frac{129}{40}$ c. $\frac{1}{16}$ d. $\frac{63}{8}$

மதிப்பு காண்க: $4-\cfrac{5}{1+\cfrac{1}{3+\cfrac{1}{2+\frac{1}{4}}}}$

a. $\frac{1}{8}$ b. $\frac{129}{40}$ c. $\frac{1}{16}$ d. $\frac{63}{8}$

21. $x+1/x = 2$ then x^3+1/x^3

$x+1/x = 2$ எனில் x^3+1/x^3 ன் மதிப்பு

a. 8 b. 2 c. 6 d. 4

22. Simplify $\sqrt{214+\sqrt{112+\sqrt{74+\sqrt{49}}}}$

a. 15 b. 18 c. 25 d. 17

சுருக்குக $\sqrt{214+\sqrt{112+\sqrt{74+\sqrt{49}}}}$

a. 15 b. 18 c. 25 d. 17

23. Find the value of $\sqrt{41-\sqrt{21+\sqrt{19-\sqrt{9}}}}$

a. 7 b. 5 **c. 6** d. 9

மதிப்புக் காண் $\sqrt{41-\sqrt{21+\sqrt{19-\sqrt{9}}}}$

a. 7 b. 5 **c. 6** d. 9

Level – III

24. $\frac{4+\sqrt{5}}{4-\sqrt{5}}-\frac{4-\sqrt{5}}{4+\sqrt{5}} = a + b\sqrt{5}$ find the value of a and b.

$\frac{4+\sqrt{5}}{4-\sqrt{5}}-\frac{4-\sqrt{5}}{4+\sqrt{5}} = a + b\sqrt{5}$ எனில் a, b ன் மதிப்புகளை காண்க.

a. a = 1, b = 0 b. a = 0, b = $\frac{-16}{11}$

c. a = 1, b = $\frac{16}{11}$ d. a = 0, b = $\frac{16}{11}$

25. If $2 = x+\frac{1}{1+\frac{1}{3+\frac{1}{4}}}$ then the value of x is

a. $\frac{12}{17}$ b. $\frac{13}{17}$ c. $\frac{18}{17}$ **d.** $\frac{21}{17}$

$2 = x+\frac{1}{1+\frac{1}{3+\frac{1}{4}}}$ எனில் x ன் மதிப்பு காண்க.

a. $\frac{12}{17}$ b. $\frac{13}{17}$ c. $\frac{18}{17}$ **d.** $\frac{21}{17}$

26. Simplify: $(7\sqrt{a} - 5\sqrt{b})$ $(7\sqrt{a} + 5\sqrt{b})$

சுருக்குக: $(7\sqrt{a} - 5\sqrt{b})(7\sqrt{a} + 5\sqrt{b})$

a. $7a^2 - 5b^2$ b. $49a - 25b$ c. $49a^2 - 25b^2$ d. $\left(7\sqrt{a}-5\sqrt{b}\right)^2$

Solution:

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

$$\left(7\sqrt{a}-5\sqrt{b}\right)\left(7\sqrt{a}+5\sqrt{b}\right) = 7^2\left(\sqrt{a}\right)^2-5^2\left(\sqrt{b}\right)^2$$

$$= 49a - 25b$$

27. $y - \frac{1}{y} = 6$ find the value of $y^3 - \frac{1}{y^3}$

$y - \frac{1}{y} = 6$ எனில் $y^3 - \frac{1}{y^3}$ ன் மதிப்பு

a. 216 b. 222 c. 234 d. 228

Solution:

$$y-\frac{1}{y} = 6$$

$y^3 - \frac{1}{y^3}$ = ?

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

$\left(y - \frac{1}{y}\right)^3 = y^3 - 3y^2\left(\frac{1}{y}\right) + 3y\left(\frac{1}{y^2}\right) - \frac{1}{y^3}$

$(6)^3 = y^3 - 3y + 3\frac{1}{y} - \frac{1}{y^3}$

$(6)^3 = y^3 - \frac{1}{y^3} - 3y + \frac{3}{y}$

$216 + 3(6) = y^3 - \frac{1}{y^3}$

$y^3 - \frac{1}{y^3}$ = 234

28. find the value of a, b if $\frac{\sqrt{7}-2}{\sqrt{7}+2} = a\sqrt{7} + b$

a, b யின் மதிப்பை காண். $\frac{\sqrt{7}-2}{\sqrt{7}+2} = a\sqrt{7} + b$

a. a = $4/3$ b = $11/3$ b. $a = -11/3$; b = $4/3$

c. $a = -4/3$ $b = -11/3$ d. $a = -4/3$; $b = 11/3$

Solution:

$\frac{\sqrt{7}-2}{\sqrt{7}+2} = a\sqrt{7} + b$

$\frac{\sqrt{7}-2}{\sqrt{7}+2} \times \frac{\sqrt{7}-2}{\sqrt{7}-2} = \frac{7 - 2\sqrt{7} - 2\sqrt{7} + 4}{7-4}$

$\frac{11 - 4\sqrt{7}}{3} = a\sqrt{7} + b$

$\Rightarrow a = \frac{-4}{3}$ and $b = \frac{11}{3}$

29. If x = $\sqrt{3}+1$, find the value of $\left(x - 2/x\right)^2$

x = $\sqrt{3}+1$ எனில் $\left(x - 2/x\right)^2$ ன் மதிப்பு?

a. $\sqrt{3}$ b. 3 c. 2 d. 4

Solution:

$x = \sqrt{3}+1$

$\frac{1}{x} = \frac{1}{\sqrt{3}+1} \times \frac{\sqrt{3}-1}{\sqrt{3}-1} = \frac{\sqrt{3}-1}{3 - \sqrt{3} + \sqrt{3} - 1}$

$= \frac{\sqrt{3}-1}{2}$

$$\frac{2}{x} = \sqrt{3}-1$$

$$\therefore \left(x-\frac{2}{x}\right)^2 = \left(\left(\sqrt{3}+1\right)-\left(\sqrt{3}-1\right)\right)^2$$

$$= \left(\cancel{\sqrt{3}}+1-\cancel{\sqrt{3}}+1\right)^2$$

$$= (2)^2 = 4$$

30. simplify: $\frac{x^3+8}{x^4+4x^2+16}$

சுருக்குக: $\frac{x^3+8}{x^4+4x^2+16}$

a. $\frac{x+2}{x^2+2x+4}$ b. $\frac{x-2}{x^2+2x+4}$ c. $\frac{x+2}{x^2-2x+4}$ d. $\frac{x-2}{x^2-2x+4}$

Solution:

$$x^3+8 = x^3+2^3$$

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

$$x^4+4x^2+16 = x^4+4x^2+16+4x^2-4x^2$$

$$= x^4+8x^2+16-4x^2$$

$$= \left(x^2+4\right)^2-(2x)^2 \quad \text{Since,} \quad (a+b)^2 = a^2+2ab+b^2$$

$$= \left(x^2+4+2x\right)\left(x^2+4-2x\right)$$

$$\therefore \frac{x^3+8}{x^4+4x^2+16} = \frac{(x+2)\left(\cancel{x^2+4-2x}\right)}{\left(x^2+4+2x\right)\left(\cancel{x^2+4-2x}\right)}$$

$$= \frac{x+2}{x^2+2x+4}$$

SIMPLIFICATION WORK SHEET – ANSWER

1	2	3	4	5	6	7	8	9	10
C	**D**	**C**	**C**	**D**	**A**	**C**	**C**	**B**	**D**
11	12	13	14	15	16	17	18	19	20
A	**D**	**A**	**B**	**D**	**B**	**A**	**C**	**B**	**A**
21	22	23	24	25	26	27	28	29	30
B	**A**	**C**	**D**	**D**	**B**	**C**	**D**	**D**	**A**