



MATHS

BOOKS - ICSE

EXPANSIONS

Questions

1. Evaluate: $(a + 2b)^2$



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2. Evaluate: $(2a - 3b)^2$



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3. If $a + b = 9$ and $ab = -22$, find : $a - b$



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4. If $a + b = 9$ and $ab = -22$, find : $a^2 - b^2$



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5. If $x \neq 0$ and $x = 2$, find $x^2 + \frac{1}{x^2}$



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6. If $x \neq 0$ and $x = 2$, find $x^4 + \frac{1}{x^4}$



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7. Given: $a^2 + \frac{1}{a^2} = 7$ and $a \neq 0$, find
 $a + \frac{1}{a}$



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8. Given: $a^2 + \frac{1}{a^2} = 7$ and $a \neq 0$, find

$$a - \frac{1}{a}$$



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9. Given: $a^2 + \frac{1}{a^2} = 7$ and $a \neq 0$, find

$$a^2 - \frac{1}{a^2}$$



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10. If $a^2 - 5a + 1 = 0$ and $a \neq 0$, find :

$$a + \frac{1}{a}$$



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11. If $a^2 - 5a + 1 = 0$ and $a \neq 0$, find :

$$a^2 + \frac{1}{a^2}$$



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12. Evaluate: $(2a + 3b)^3$



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13. Evaluate: $(4a - 5b)^3$



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14. If $a^2 + \frac{1}{a^2} = 23$ and $a \neq 0$, find the value of $a^3 + \frac{1}{a^3}$



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15. If $a + b + c = 0$, show that :

$$a^3 + b^3 + c^3 = 3abc$$



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16. Use property to evaluate:

$$8^3 + (-5)^3 + (-3)^3$$



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17. Use property to evaluate: $2^3 + 4^3 + (-6)^3$



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18. Expand: $(3x - 2y + 4)(3x - 2y - 4)$



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19. Expand: $(5x - 3y + 2)(5x + 3y + 2)$



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20. Expand: $(2x + 3y - 4z)^2$



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21. Expand: $(3x - 2y + 5z)^2$



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22. Expand: $(4a - 5b - 2c)^2$



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23. If $a^2 + b^2 + c^2 = 29$ and $a + b + c = 9$,

find: $ab + bc + ca$



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24. If $a + b - c = 4$ and $a^2 + b^2 + c^2 = 38$,

find $ab - bc - ca$



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25. If $a - b - c = 3$ and $a^2 + b^2 + c^2 = 77$,

find: $ab - bc + ca$



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26.

If

$$x^3 + y^3 + z^3 = 3xyz \text{ and } x + y + z = 0,$$

find the value of :

$$\frac{(x + y)^2}{xy} + \frac{(y + z)^2}{yz} + \frac{(z + x)^2}{zx}$$



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27. Find $(2x + 3y)^2$



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28. In the expansion of $(5x - 3)(x + 2)^2$, find

:

coefficients of x^2 and x



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29. In the expansion of $(5x - 3)(x + 2)^2$, find

:

constant term



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30. If each of a , b and c is a non-zero number

and $\frac{a}{b} = \frac{b}{c}$, show that:

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



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31. If the sum of two numbers is 5 and the sum of their cubes is 35, find the sum of their squares



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32. If $a = 2$, $b = 3$ and $c = 4$, find the value of :

$$\frac{ab + bc + ca - a^2 - b^2 - c^2}{3abc - a^3 - b^3 - c^3}, \text{ using suitable}$$

identity



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33.

Evaluate:

$$\frac{0.6 \times 0.6 \times 0.6 - 0.3 \times 0.3 \times 0.3}{0.6 \times 0.6 + 0.6 \times 0.3 + 0.3 \times 0.3},$$

using

suitable identity



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34. If $x^2 + y^2 + z^2 - xy - yz - zx = 0$,

prove that : $x = y = z$



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1. Find the square of:

$$2a + b$$



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2. Find the square of:

$$3a + 7b$$



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3. Find the square of:

$$3a - 4b$$



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4. Find the square of:

$$\frac{3a}{2b} - \frac{2b}{3a}$$



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5. Use identities to evaluate: $(101)^2$



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6. Use identities to evaluate: $(502)^2$



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7. Use identities to evaluate: $(97)^2$



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8. Use identities to evaluate: $(998)^2$



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9. Evaluate:

$$\left(\frac{7}{8}x + \frac{4}{5}y\right)^2$$



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10. Evaluate:

$$\left(\frac{2x}{7} - \frac{7y}{4}\right)^2$$



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11.

Evaluate:

$$\left(\frac{a}{2b} + \frac{2b}{a}\right)^2 - \left(\frac{a}{2b} - \frac{2b}{a}\right)^2 - 4$$



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12. Evaluate: $(4a + 3b)^2 - (4a - 3b)^2 + 48ab$



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13. If $a + b = 7$ and $ab = 10$, find $a - b$



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14. If $a - b = 7$ and $ab = 18$, find $a + b$



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15. If $x + y = \frac{7}{2}$ and $xy = \frac{5}{2}$, find

$x - y$



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16. If $x + y = \frac{7}{2}$ and $xy = \frac{5}{2}$, find

$$x^2 - y^2$$



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17. If $a - b = 0.9$ and $ab = 0.36$ find:

$$a + b$$



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18. If $a - b = 0.9$ and $ab = 0.36$ find:

$$a^2 - b^2$$



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19. If $a - b = 4$ and $a + b = 6$, find:

$$a^2 + b^2$$



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20. If $a - b = 4$ and $a + b = 6$, find:

ab



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21. If $a + \frac{1}{a} = 6$ and $a \neq 0$, find

$a - \frac{1}{a}$



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22. If $a + \frac{1}{a} = 6$ and $a \neq 0$, find

$$a^2 - \frac{1}{a^2}$$



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23. If $a - \frac{1}{a} = 8$ and $a \neq 0$, find:

$$a + \frac{1}{a}$$



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24. If $a - \frac{1}{a} = 8$ and $a \neq 0$, find:

$$a^2 - \frac{1}{a^2}$$



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25. If $a^2 - 3a + 1 = 0$ and $a \neq 0$, find :

$$a + \frac{1}{a}$$



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26. If $a^2 - 3a + 1 = 0$ and $a \neq 0$, find :

$$a^2 + \frac{1}{a^2}$$



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27. If $a^2 - 5a - 1 = 0$ and $a \neq 0$, find :

$$a - \frac{1}{a}$$



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28. If $a^2 - 5a - 1 = 0$ and $a \neq 0$, find :

$$a - \frac{1}{a}$$



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29. If $a^2 - 5a - 1 = 0$ and $a \neq 0$, find :

$$a^2 - \frac{1}{a^2}$$



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30. If $3x + 4y = 16$ and $xy = 4$, find the value of $9x^2 + 16y^2$



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31. The number x is 2 more than the number y . If the sum of the squares of x and y is 34, find the product of x and y .

Given : $x - y = 2$ and $x^2 + y^2 = 34$

To find the value of xy .



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32. The difference between two positive numbers is 5 and the sum of their squares is 73. Find the product of these numbers.



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Exercise 4 B

1. Find the cube of: $3a - 2b$



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2. Find the cube of: $5a + 3b$



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3. Find the cube of: $2a + \frac{1}{2a} (a \neq 0)$



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4. Find the cube of: $3a - \frac{1}{a} (a \neq 0)$



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5. If $a^2 + \frac{1}{a^2} = 47$ and $a \neq 0$, find:

$$a + \frac{1}{a}$$



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6. If $a^2 + \frac{1}{a^2} = 47$ and $a \neq 0$, find:

$$a^3 + \frac{1}{a^3}$$



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7. If $a^2 + \frac{1}{a^2} = 18$ and $a \neq 0$, find:

$$a - \frac{1}{a}$$



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8. If $a^2 + \frac{1}{a^2} = 18$ and $a \neq 0$, find:

$$a^3 - \frac{1}{a^3}$$



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9. If $a + \frac{1}{a} = p$ and $a \neq 0$, then show that:

$$a^3 + \frac{1}{a^3} = p(p^2 - 3)$$



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10. If $a + 2b = 5$, then show that:

$$a^3 + 8b^3 + 30ab = 125$$



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11. If $\left(a + \frac{1}{a}\right)^2 = 3$ and $a \neq 0$, then show that: $a^3 + \frac{1}{a^3} = 0$



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12. If $a + 2b + c = 0$, then show that:

$$a^3 + 8b^3 + c^3 = 6abc$$



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13. Use property to evaluate:

$$13^3 + (-8)^3 + (-5)^3$$



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14. Use property to evaluate:

$$7^3 + 3^3 + (-10)^3$$



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15. Use property to evaluate:

$$9^3 - 5^3 - 4^3$$



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16. Use property to evaluate:

$$38^3 + (-26)^3 + (-12)^3$$



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17. If $a \neq 0$ and $a - \frac{1}{a} = 3$, find :

$$a^2 + \frac{1}{a^2}$$



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18. If $a \neq 0$ and $a - \frac{1}{a} = 3$, find :

$$a^3 - \frac{1}{a^3}$$



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19. If $a \neq 0$ and $a - \frac{1}{a} = 4$, find

$$a^2 + \frac{1}{a^2}$$



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20. If $a \neq 0$ and $a - \frac{1}{a} = 4$, find

$$a^4 + \frac{1}{a^4}$$



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21. If $a \neq 0$ and $a - \frac{1}{a} = 4$, find

$$a^3 - \frac{1}{a^3}$$



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22. If $x \neq 0$ and $x + \frac{1}{x} = 2$, then show that:

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



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23. If $2x - 3y = 10$ and $xy = 16$, find the value of $8x^3 - 27y^3$



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24. Expand: $(3x + 5y + 2z)(3x - 5y + 2z)$



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25. Expand: $(3x - 5y - 2z)(3x - 5y + 2z)$



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26. The sum of two numbers is 9 and their product is 20. Find the sum of their squares



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27. The sum of two numbers is 9 and their product is 20. Find the sum of their cubes



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28. Two positive numbers x and y are such that $x > y$. If the difference of these numbers is 5 and their product is 24, find:
sum of these numbers



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29. Two positive numbers x and y are such that $x > y$. If the difference of these numbers is 5 and their product is 24, find:
difference of their cubes



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30. Two positive numbers x and y are such that $x > y$. If the difference of these numbers is 5 and their product is 24, find:
sum of their cubes



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31. If $4x^2 + y^2 = a$ and $xy = b$, find the value
of $2x + y$



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Exercise 4 C

1. Expand: $(x + 8)(x + 10)$



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2. Expand: $(x + 8)(x - 10)$



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3. Expand: $(x - 8)(x + 10)$



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4. Expand: $(x - 8)(x - 10)$



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5. Expand: $\left(2x - \frac{1}{x}\right)\left(3x + \frac{2}{x}\right)$



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6. Expand: $\left(3a + \frac{2}{b}\right)\left(2a - \frac{3}{b}\right)$



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7. Expand: $(x + y - z)^2$



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8. Expand: $(x - 2y + 2)^2$



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9. Expand: $(5a - 3b + c)^2$



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10. Expand: $(5x - 3y - 2)^2$



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11. Expand: $\left(x - \frac{1}{x} + 5\right)^2$



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12. If $a + b + c = 12$ and $a^2 + b^2 + c^2 = 50$,
find $ab + bc + ca$



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13. If
 $a^2 + b^2 + c^2 = 35$ and $ab + bc + ca = 23$,
find $a + b + c$



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14. If $a + b + c = p$ and $ab + bc + ca = q$,

find $a^2 + b^2 + c^2$



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15.

If

$a^2 + b^2 + c^2 = 50$ and $ab + bc + ca = 47$,

find $a + b + c$



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16. If $x + y - z = 4$ and $x^2 + y^2 + z^2 = 30$,

then find the value of $xy - yz - zx$



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Exercise 4 D

1. If

$$x + 2y + 3z = 0 \text{ and } x^3 + 4y^3 + 9z^3 = 18xyz$$

,

evaluate:

$$\frac{(x + 2y)^2}{xy} + \frac{(2y + 3z)^2}{yz} + \frac{(3z + x)^2}{zx}$$



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2. If $a = \frac{1}{m} = m$ and $a \neq 0$, find in terms of 'm', the value of :

$$a - \frac{1}{a}$$



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3. If $a = \frac{1}{m} = m$ and $a \neq 0$, find in terms of 'm', the value of :

$$a^2 - \frac{1}{a^2}$$



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4. In the expansion of $(2x^2 - 8)(x - 4)^2$, find the value of coefficient of x^3



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5. In the expansion of $(2x^2 - 8)(x - 4)^2$, find the value of coefficient of x^2



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6. In the expansion of $(2x^2 - 8)(x - 4)^2$, find the value of constant term



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7. If $x > 0$ and $x^2 + \frac{1}{9x^2} = \frac{25}{36}$, find $x^3 + \frac{1}{27x^3}$



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8. If $2(x^2 + 1) = 5x$, find

$$x - \frac{1}{x}$$



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9. If $2(x^2 + 1) = 5x$, find

$$x^3 - \frac{1}{x^3}$$



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10. If $a^2 + b^2 = 34$ and $ab = 12$, find:

$$3(a + b)^2 + 5(a - b)^2$$



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11. If $a^2 + b^2 = 34$ and $ab = 12$, find:

$$7(a - b)^2 - 2(a + b)^2$$



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12. If $3x - \frac{4}{x} = 4$ and $x \neq 0$, find $27x^3 - \frac{64}{x^3}$



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13. If $x^2 + \frac{1}{x^2} = 7$ and $x \neq 0$, find the value of: $7x^3 + 8x - \frac{7}{x^3} - \frac{8}{x}$



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14. If $x = \frac{1}{x} - 5$ and $x \neq 5$, find $x^2 - \frac{1}{x^2}$



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15. If $x = \frac{1}{5-x}$ and $x \neq 5$, find $x^3 + \frac{1}{x^3}$



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16. If $3a + 5b + 4c = 0$, show that:

$$27a^3 + 125b^3 + 64c^3 = 180abc$$



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17. The sum of two numbers is 7 and the sum of their cubes is 133. Find the sum of their squares



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18. In each of the following find the value of 'a'

$$4x^2 + ax + 9 = (2x + 3)^2$$



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19. In each of the following find the value of 'a'

$$4x^2 + ax + 9 = (2x - 3)^2$$



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20. In each of the following find the value of 'a'

$$9x^2 + (7a - 5)x + 25 = (3x + 5)^2$$



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21. If $\frac{x^2 + 1}{x} = 3\frac{1}{3}$ and $x > 1$, find

$$x - \frac{1}{x}$$



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22. If $\frac{x^2 + 1}{x} = 3\frac{1}{3}$ and $x > 1$, find

$$x^3 - \frac{1}{x^3}$$



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23. The difference between two positive numbers is 4 and the difference between their cubes is 316. Find:
their product



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24. The difference between two positive numbers is 4 and the difference between their cubes is 316. Find:
their product





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Exercise 4 E

1. Simplify: $(x + 6)(x + 4)(x - 2)$



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2. Simplify: $(x - 6)(x - 4)(x + 2)$



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3. Simplify: $(x - 6)(x - 4)(x - 2)$



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4. Simplify: $(x + 6)(x - 4)(x - 2)$



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5. Simplify using following identity:

$$(a \pm b)(a^2 \mp ab + b^2) = a^3 \pm b^3$$

$$(2x + 3y)(4x^2 - 6xy + 9y^2)$$



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6. Simplify using following identity:

$$(a \pm b)(a^2ab + b^2) = a^3 \pm b^3$$

$$\left(3x - \frac{5}{x}\right) \left(9x^2 + 15 + \frac{25}{x^2}\right)$$



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7. Simplify using following identity:

$$(a \pm b)(a^2ab + b^2) = a^3 \pm b^3$$

$$\left(\frac{a}{3} - 3b\right) \left(\frac{a^2}{9} + ab + 9b^2\right)$$



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8. Using suitable identity, evaluate:

$$(104)^3$$



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9. Using suitable identity, evaluate:

$$(97)^3$$



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10.

Simplify:

$$\frac{(x^2 - y^2)^3 + (y^2 - z^2)^3 + (z^2 - x^2)^3}{(x - y)^3 + (y - z)^3 + (z - x)^3}$$



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11.

Evaluate:

$$\frac{0.8 \times 0.8 \times 0.8 + 0.5 \times 0.5 \times 0.5}{0.8 \times 0.8 - 0.8 \times 0.5 + 0.5 \times 0.5}$$



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12.

Evaluate:

$$\frac{1.2 \times 1.2 + 1.2 \times 0.3 + 0.3 \times 0.3}{1.2 \times 1.2 \times 1.2 - 0.3 \times 0.3 \times 0.3}$$



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13. If $a - 2b + 3c = 0$, state the value of $a^3 - 8b^3 + 27c^3$



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14. If $x + 5y = 10$, find the value of $x^3 + 125y^3 + 150xy - 1000$



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15. If $x = 3 + 2\sqrt{2}$, find

$$\frac{1}{x}$$



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16. If $x = 3 + 2\sqrt{2}$, find

$$x - \frac{1}{x}$$



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17. If $x = 3 + 2\sqrt{2}$, find

$$\left(x - \frac{1}{x}\right)^3$$



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18. If $x = 3 + 2\sqrt{2}$, find

$$x^3 - \frac{1}{x^3}$$



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19. If $a + b = 11$ and $a^2 + b^2 = 65$, find

$$a^3 + b^3$$



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20. If x, y and z are three different numbers, then prove that :

$x^2 + y^2 + z^2 - xy - yz - zx$ is always positive



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21. Find: $(a + b)(a + b)$



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22. Find : $(a + b)(a + b)(a + b)$



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23.

Find :

- (i) $(a + b)(a + b)$
- (ii) $(a + b)(a + b)(a + b)$
- (iii) $(a - b)(a - b)(a - b)$ by using the result of part (ii)



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1. Use identities to evaluate :

$$(i)(101)^2 \quad (ii)(998)^2$$



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2. If $x + y = \frac{7}{2}$ and $xy = \frac{5}{2}$, find

$$x - y$$



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3. The number x is 2 more than the number y .

If the sum of the squares of x and y is 34, find the product of x and y .

$$\text{Given : } x - y = 2 \text{ and } x^2 + y^2 = 34$$

To find the value of xy .



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4. If $a^2 + \frac{1}{a^2} = 47$ and $a \neq 0$, find:

$$a + \frac{1}{a}$$



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5. If $a + 2b + c = 0$, then show that:

$$a^3 + 8b^3 + c^3 = 6abc$$



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6. Use property to evaluate :

(i) $13^3 + (-8)^3 + (-5)^3$

(ii) $9^3 - 5^3 - 4^3$



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7. If $x + y - z = 4$ and $x^2 + y^2 + z^2 = 30$,

then find the value of $xy - yz - zx$



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8. If $x^2 + \frac{1}{x^2} = 7$ and $x \neq 0$, find the value

of: $7x^3 + 8x - \frac{7}{x^3} - \frac{8}{x}$



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9. In each of the following find the value of 'a' :

(i) $4x^2 + ax + 9 = (2x + 3)^2$

$$(ii) 9x^2 + (7a - 5)x + 25 = (3x + 5)^2$$



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10. If $x - \frac{1}{x} = 3$, find the value of $x^3 - \frac{1}{x^3}$



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11. If $x - \frac{1}{x} = 3$, find the value of $x^3 - \frac{1}{x^3}$



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4 Marks Questions

1. Evaluate :

$$(i) \left(\frac{a}{2b} + \frac{2b}{a} \right)^2 - \left(\frac{a}{2b} - \frac{2b}{a} \right)^2 - 4$$

$$(ii) (4a + 3b)^2 - (4a - 3b)^2 + 48ab$$



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2. If $a^2 - 5a - 1 = 0$ and $a \neq 0$, find :

$$a^2 - \frac{1}{a^2}$$



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3. If $x \neq 0$ and $x + \frac{1}{x} = 2$, then show that:

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



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4. Two positive numbers x and y are such that

$x > y$. If the difference of these numbers is 5

and their product is 24 find :

(i) sum of these number

(ii) difference of their cubes

(iii) Sum of their cubes



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5. Expand :

$$(i)(5 - 3y - 2)^2 \quad (ii) \left(x - \frac{1}{x} + 5\right)^2$$



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6.

If

$$x + 2y + 3z = 0 \text{ and } x^3 + 4y^3 + 9z^3 = 18xyz$$

,

evaluate:

$$\frac{(x + 2y)^2}{xy} + \frac{(2y + 3z)^2}{yz} + \frac{(3z + x)^2}{zx}$$



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7. In the expansion of $(2x^2 - 8)(x - 4)^2$, find the value of :

(i) coefficient of x^3 (ii) Coefficient of x^2

(iii) Constant term



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8. If $2(x^2 + 1) = 5x$, find :

(i) $x - \frac{1}{x}$ (ii) $x^3 - \frac{1}{x^3}$



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9.

Simplify:

$$\frac{(x^2 - y^2)^3 + (y^2 - z^2)^3 + (z^2 - x^2)^3}{(x - y)^3 + (y - z)^3 + (z - x)^3}$$



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10. If $x = 3 + 2\sqrt{2}$, find :

(i) $\frac{1}{x}$ (ii) $x - \frac{1}{x}$

(iii) $\left(x - \frac{1}{x}\right)^3$ (iv) $x^3 - \frac{1}{x^3}$



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