



Part (1)

(1) Complete the following:

- 1) $(a - 2)(2a - 3) = \dots - 7a + \dots$
- 2) $(X + \dots)(2X - 3) = \dots + \dots - 15$
- 3) $(X + \dots)(3X - 2) = \dots + \dots - 10$
- 4) $(2X + 3Y)(\dots + 2Y) = 2X^2 + \dots + \dots$
- 5) $(2a + \dots)(\dots + 3b) = (2a^2 + \dots + 3b^2)$
- 6) $3a^2 + 7a + 2 = (3a + \dots)(a + \dots)$
- 7) $\dots X^2 + 5X - 12 = (2X - 3)(\dots \dots \dots)$
- 8) $X^3 - \dots = (X - \dots)(\dots + \dots + 4)$
- 9) $(X - Y)^2 + 4XY = (\dots + \dots)^2$
- 10) $(5a - \dots)^2 = \dots - 30a + \dots$
- 11) $(7X - 5Y)(\dots - \dots) = 49X^2 - \dots + 25Y^2$
- 12) $11X^2 - 4XY - \dots = (X - Y)(\dots + \dots)$
- 13) $\dots - 49X^2 = (3 - \dots)(3 + \dots)$
- 14) $9X^2 - 3X = 3X(3X - \dots)$
- 15) $8a^3 - b^3 = (\dots - b)(4a^2 + \dots + \dots)$
- 16) $4X^2 - \dots + \dots = (\dots - 3Y)^2$
- 17) The set values of a which make the expression: $X^2 + aX - 15$ can be factorized are
- 18) The expression $4X^2 - 12X + K$ is a perfect square when $K = \dots$
- 19) If the expression $121X^2 + KX + 100$ is perfect square when $K = \dots$
- 20) The expression : $9X^2 - 30X + a$ is perfect square when $a = \dots$
- 21) If $X^2 - Y^2 = 35$, $X - Y = 5$ then $X + Y = \dots$



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- 22) If the expression: $X^2 + aX - 15$ can be factorized then the negative values of a are
- 23) If $a^2 + b^2 = 7$, $ab = 3$ then $(a - b)^2 = \dots\dots\dots$
- 24) The expression $25a^2 + 10a + m$ is a perfect square when $m = \dots\dots\dots$
- 25) If $x^2 - K + 10 = (X - 3)(X + 3)$ then $K = \dots\dots\dots$
- 26) If the expression $X^2 + mX + 16$ is a perfect square then $m = \dots\dots\dots$
- 27) If : $X^2 + K + 17 = (X - 5)(X + 5)$ then $K = \dots\dots\dots$
- 28) If : $X + \frac{1}{X} = 5$ then $X^2 + \frac{1}{X^2} = \dots\dots\dots$ where $X \neq \text{zero}$.
- 29) If the perimeter of the square equals $2X$ cm then its area equals
- 30) If $(X - 3)$ is one of the two factors of the expression $X^2 + 2X - 15$ then the other factor is
- 31) If (-4) is one root of the two roots for the equation $X^2 + 3X - 4 = 0$ then the other root is
- 32) The solution set of the equation: $X^2 + 4 = 0$ is
- 33) The solution set of the equation: $X^2 - 1 = 0$ is
- 34) The simplest form of the algebraic expression $X(y - z) + L(y - z)$ is
- 35) If the age of Kamal now is X year then his age after 5 years is
- 36) If $a(X + Y) - b(X + Y) = 15$ and $(X + Y) = 5$ the $a - b = \dots\dots\dots$
- 37) If $(X + 5)$ is one of the roots of $X^3 + 125$, the other root =
- 38) If $(X + Y)^2 = 42$, $X^2 + Y^2 = 12$ then $XY = \dots\dots\dots$



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(2) Choose the correct answer:-

- 1) If $X = 2$, $Y = 5$ then : $X^2 + 2XY + Y^2$ equals
a) 5 b) 7 c) 9 d) 49
- 2) $X^2 - 4$ equals :
a) $4 - X^2$ b) $(X - 2)^2$ c) $(X-2)(X+2)$ d) $(X - 4)^2$
- 3) $(a - 1) (a^2 + a + 1)$ equals
a) $a^3 - 1$ b) $a^3 + 1$ c) $(a - 1)^3$ d) $1 - a^3$
- 4) If $X^2 + Y^2 = 7$, $XY = 3$ then $(X - Y)^2$ equals
a) -1 b) 1 c) ± 1 d) 10
- 5) If $16X^2 + KX + 9$ is a perfect square then K equals
a) ± 6 b) ± 12 c) ± 24 d) ± 144
- 6) If $X^2 - 6X + K$ is a perfect square then K equals
a) 3 b) 6 c) 9 d) 36
- 7) If $KX^2 - 12X + 4$ is a perfect square then K equals
a) -6 b) -4 c) -2 d) 9
- 8) If $(a + b)^2 = 43$, $(a^2 + b^2) = 35$ then ab equals
a) 4 b) 8 c) 16 d) 78
- 9) If the expression $X^2 + KX - 42$ can be factorized, then K can't equal
a) -2 b) 2 c) 3 d) 5
- 10) If the expression $X^2 + KX + 2$ can be factorized then K equals
a) 1 b) 2 c) 3 d) 4
- 11) If $X^2 - Y^2 = 12$, $X - Y = 3$ then $X + Y$ equals
a) 3 b) 4 c) 12 d) 15
- 12) If $X^2 + KX - 6 = (X + 3) (X - 2)$ then K equals
a) -1 b) 1 c) 2 d) 3



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13) The expression $X^2 + 8X + C$ is a perfect square when C equals

- a) 2 b) 4 c) 16 d) 64

14) If $(X + Y)^2 = 24$, $XY = 8$, then $X^2 + Y^2 = \dots\dots\dots$

- a) 8 b) 16 c) 24 d) 32

15) If $X^2 + KX - 21 = (X - 3)(X + 7)$ then K equals

- a) -4 b) 4 c) 8 d) 20

16) If $(X + Y)^2 = 10$, $(X^2 + Y^2) = 4$ then XY equals

- a) 2 b) 3 c) 6 d) 14

17) The expression: $(X - 2Y)(X^2 + 2XY^2 + 4Y^2)$ equals

- a) $X^3 - 2Y^3$ b) $X^3 - 8Y^3$ c) $X^3 + 2Y^3$ d) $X^3 + 8Y^3$

18) If $64a^2 - 32a + K$ is a perfect square then K equals

- a) 1 b) 4 c) 11 d) 16

19) If $(X - Y) = 5$, $X^2 + XY + Y^2 = 7$ then $X^3 - Y^3$ equals

- a) 2 b) 7 c) 12 d) 35

20) The expression $X(Y + 3) + Z(Y + 3)$ equal

- a) $X + Y + Z + 6$ b) $(X + Z)(Y + 3)$
c) $(X + Z)(Y + 3)^2$ d) $(X + Z) \times 2(Y + 3)$

21) If $a^2 + 2ab + b^2 + 25$, then $a + b$ equals

- a) -5 b) 5 c) ± 5 d) 625

22) If $X = 13$, $Y = 11$ then $X^2 - 2XY + Y^2$ equals

- a) 2 b) 4 c) 24 d) 48

23) If $8X^3 + a^3 = (2X + a)(4X^2 - 4aX + a^2)$ then a equals

- a) 7 b) 14 c) 49 d) 343

24) The result of the expression: $(8X^3 - 27Y^3) \div (2X - 3Y)$ where $2X \neq 3Y$ equals

- a) $4X^2 + 6XY + 6Y^2$ b) $4X^2 - 6XY + 6Y^2$
c) $4X^2 - 12XY + 9Y^2$ d) $4X^2 + 12XY + 9Y^2$



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- 25) If $X^3 + 27 = (X + 3)(X^2 + K + 9)$ then K equals
- a) $-6X$ b) $-3X$ c) $3X$ d) $6X$
- 26) If the expression $X^2 + aX + 9$ is a perfect square then a equals...
- a) zero b) ± 3 c) ± 6 d) ± 12
- 27) If $X^3 - Y^3 = 26$, $X^2 + XY + Y^2 = 13$ then $X - Y =$
- a) 2 b) 4 c) 13 d) 39
- 28) If 2 is a solution for the equation $x^2 - 5x + a = 0$ then a equals
- a) -3 b) -6 c) 3 d) 6
- 29) If four times a number is 48 then one third of this number equals
- a) 4 b) 8 c) 12 d) 16
- 30) The solution set of the equation: $(x - 1)^2 = 0$ is
- a) $\{0\}$ b) $\{-1\}$ c) $\{1, -1\}$ d) $\{1\}$
- 31) The dimension of a rectangle X cm, X + 1 cm and it area is 30 cm^2 then x =
- a) 3 b) 4 c) 5 d) 6
- 32) If the average of two numbers is 5 one of them is 3 then the other is
- a) 2 b) 4 c) 7 d) 13
- 33) If the age of Zyad now is X year then his age before three years was
- a) $3X$ b) $3 - X$ c) $X - 3$ d) $X + 3$
- 34) The area of a rectangle whose length X + Y and its width X - Y is
- a) $2X$ b) $4X$ c) $X^2 - Y^2$ d) $(X - Y)^2$
- 35) A natural number if we divide it by each of the numbers 2, 3, 4 then the remainder is 1 but if divide by 5 there is no remainder, then this number is
- a) 13 b) 15 c) 25 d) 35



(3) Factorize each of the following:

1) $X^2 - 7X - 8$

3) $2Y^4 + 3Y^2 - 5$

5) $4X^2 - 20X + 25$

7) $25X^3 - 10X^2Y + XY^2$

9) $-19ab + 6b^2 + 15a^2$

11) $25a^4 - 1$

13) $16X^4 - 81$

15) $\frac{1}{3}X^3 - 9$

17) $12X^3Y^4 + 3X^5Y^2$

19) $2XY^3 - \frac{1}{8}X^3Y$

21) $\frac{3}{4}X^3 - 48$

23) $(a + b)^3 + C^3$

25) $2 - 2(X - 1)^3$

27) $a^3 - ab^2 - a^2b + b^3$

29) $4X^2 - 4XY - 16 + Y^2$

31) $(5X - 2)^2 - 4X - 5$

33) $50 - 2(2X + 1)^2$

2) $Y^2 - 14Y + 49$

4) $3X^2 - 15X + 12$

6) $X^6 - 9X^3 + 8$

8) $X^2Y^2 - 24XY - 25$

10) $6X^2 - 13XY + 6Y^2$

12) $25X^2Y - 15XY + 35XY$

14) $X^3 + 64Y^3$

16) $\frac{X^2}{4} - \frac{Y^2}{49}$

18) $8X^3 - 2Y^2X$

20) $2X^3Y - 8XY^3$

22) $0.027a^3 - 0.001b^3$

24) $(a - 2b)^3 - 4(a - 2b)$

26) $Y^3 - Y^2 - 9Y + 9$

28) $X^3 - 3X^2 - 6X + 8$

30) $3X^3 - 2X^2 + 12X - 8$

32) $(X - 2)(X + 3) - 6X$

34) $5Y^2 - 4X(7Y + 3X)$

(4) Answer the following question:

1) Using the difference between two squares to evaluate $(23.5)^2 - (18.5)^2$

2) Using the factorization to evaluate $2(26.18)^2 - 2(23.82)^2$

3) Simplify to the simplest form: $(a - 2b)(a + 2b) + 5b^2$



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- 4) Simplify to the simplest form: $X^2 (2X - 3) - 9 (2X - 3)$
- 5) Simplify: $(2a - b)^2 + (a + 2b) (a - b)$ then find the value when $a = 1, b = 2$
- 6) Simplify to the simplest form: $(2X - 3Y)^2 + (3X - 1) (3X + 1)$
- 7) Simplify to the simplest form: $(2a - 3b) (a + 2b) + a^2 - 2b^2$
- 8) If $(Y + 2)$ is one factor of the two factors of the expression $4Y^2 + Y - 14$ find the other factor.
- 9) If $(3a + 4b)$ is one factor of the expression $15a^2 + 17ab - 4b^2$ find the other factor.
- 10) Using factorization to evaluate the value of X if: $(25)^2 - (15)^2 = 40X$
- 11) If : $X + Y = 7$, $a - 2b = 4$ find the numerical value of $a(X + Y) - 2b (X + Y)$.
- 12) Put in the simplest form: $(X - Y) (X + Y) (X^4 - 2X^2Y^2 + Y^4)$
- 13) If $X + \frac{1}{X} = 5$ then find $X^2 + \frac{1}{X^2}$
- 14) If $X^2 + \frac{1}{X^2} = 34$ find the value of $X + \frac{1}{X}$.
- 15) Find in R the S.S of the following equations:
 - a) $X^2 = 4X$
 - b) $4X^2 - 9 = 0$
 - c) $16X^4 - 81 = 0$
 - d) $X^2 - X - 12 = 0$
 - e) $9 - (X + 1)^2 = 0$
 - f) $X (X - 2) - 3 (2 - X) = 0$
 - g) $(4X - 1) (X + 3) - (X - 5)^2 + 4 = 0$
 - h) $\frac{X-1}{7} = \frac{8}{X}$
 - k) $X (X - 2) + 1 = 0$



Part (2)

(1) Answer the following questions:

- 1) A rectangle of area $x^3 - x^2 - 3x + 6$ and of length $x^2 - 3x + 3$ find its width in term of x then find its perimeter at $x = 6$ cm.
- 2) A rectangle of dimension $(x + 1)$ cm, $(x + 5)$ cm find its area and its perimeter.
- 3) A square of side length $(5a + b)$ cm, where $a, b \in \mathbb{Z}^+$ find its area then find the numerical value of its area when $a = 2$ cm, $b = 3$ cm.
- 4) The sum of the squares of two consecutive even integers numbers is 100 find the two numbers.
- 5) The length of a rectangle is more than its width by 3 cm and its area 28 cm^2 find its dimension.
- 6) The ratio between two positive numbers is $2 : 3$ and their product is more than twice the greater by 12 find the two numbers.
- 7) The length of a rectangle is more than its width by 5 cm and if its area 36 cm^2 find its perimeter.
- 8) A square of side length X cm and a rectangle of dimensions 2 cm, X cm if the sum of their areas is 15 cm^2 find the perimeter of the square.

(2) Complete the following:

- 1) The number $(\sqrt{2})^{-3}$ in the simplest form is
- 2) The number $\frac{1}{(\sqrt{5})^{-2}}$ in the simplest form is



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3) $\left(\frac{2}{3}\right)^{-4} = \left(\frac{\dots}{\dots}\right)^2$

4) If $3^{x-2} = 1$ then $x = \dots$

5) If $3^{x-1} = 27$ then $x = \dots$

6) The simplest form the expression $(\sqrt{2})^{\text{zero}} \times (\sqrt{2}) \times (\sqrt{2})^2 \times (\sqrt{2})^3$ is \dots

7) The greater number $(-\sqrt{11})^{24}$ or $(-\sqrt{11})^{25}$ is \dots

8) The simplest form of the expression $((\sqrt{7})^2)^3 - ((\sqrt{7})^3)^2 = \dots$

9) The value of the expression $\sqrt[3]{\frac{216}{2^3 \times 3^3}} = \dots$

10) If five times a number is 5^3 then $\frac{4}{5}$ of this number is \dots

11) The simplest form of the expression: $2^{\text{zero}} + (2)^{-1} - \left(\frac{-1}{\sqrt{2}}\right)^2 = \dots$

12) If $X = (\sqrt{3} + 2)^9$, $Y = (\sqrt{3} - 2)^9$ then $XY = \dots$

13) $X^{-2} + 1 = X^{-2} (\dots + \dots)$ where $X \neq 0$

14) If $3^x \times 2^{-x} = 1.5$ then $x = \dots$

15) If $4^{x-10} = \frac{1}{16}$ then $\sqrt[3]{X} = \dots$

16) The simplest form of the expression: $2^{-3} \times (2)^{-2} \div 4^{-3} = \dots$

17) The simplest form of the expression: $(3^{-2})^3 \div 9^{-3} \times (-2)^{-1} = \dots$

18) The simplest form of the expression: $(2^3 \times 2^{-2})^7 \div (\sqrt[3]{-8})^{\text{zero}} = \dots$

19) If $3^x + 3^x + 3^x = 1$ then $x = \dots$

20) If $\frac{2^x \times 3^x}{(12)^x} = \frac{1}{2}$ then $x = \dots$



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(3) Choose the correct answer:

- 1) 3^{-2} equals
- a) -9 b) $-\frac{1}{9}$ c) $\frac{1}{9}$ d) 9
- 2) 0.002×0.05 equals
- a) 10^{-5} b) 10^{-4} c) 10^4 d) 10^5
- 3) What is the nearest value of $11^2 + 9^2$
- a) $22 + 18$ b) $211 + 29$ c) $120 + 80$ d) $120 + 20$
- 4) The value of the expression $2^{20} + 2^{21}$ equals
- a) 2×2^{40} b) 2×2^{41} c) 3×2^{20} d) 3×2^{21}
- 5) One sixth of the number: $2^{12} \times 3^{12}$ is
- a) 6^2 b) 6^4 c) 6^{11} d) 6^{23}
- 6) The value of the expression: $2^5 + (\sqrt{2})^{10}$ equals
- a) 2^6 b) 2^{10} c) $(\sqrt{2})^{15}$ d) $(\sqrt{2})^{20}$
- 7) $4^3 + 4^3 + 4^3 + 4^3$ equals
- a) 4^3 b) 4^4 c) 4^{12} d) 4^{81}
- 8) $\left(\frac{\sqrt{5}}{3}\right)^{-2}$ equals
- a) $-\frac{9}{5}$ b) $-\frac{5}{9}$ c) $\frac{5}{9}$ d) $\frac{9}{5}$
- 9) If $X = \frac{\sqrt{9}}{\sqrt{3}}$ then X^{-1} equals:
- a) $\frac{\sqrt{3}}{3}$ b) $\frac{\sqrt{3}}{\sqrt{2}}$ c) $\sqrt{3}$ d) 2
- 10) If $6^x = 7$ then 6^{x+1} equals
- a) 8 b) 13 c) 36 d) 42
- 11) If $3^x = 5$ then $(27)^x$ equals
- a) 9 b) 25 c) 125 d) 729



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- 12) If $5^x = 4$ then 5^{x-1} equals
- a) 1.25 b) 0.8 c) 0.125 d) 0.08
- 13) If $9^{8-2x} = 1$ then X equals
- a) zero b) $\frac{1}{4}$ c) 4 d) 6
- 14) If $(X - 5)^0 = 1$ then $X \in$
- a) $\mathbb{R} - \{5\}$ b) $\mathbb{R} - \{-5\}$ c) $\{5\}$ d) \mathbb{R}
- 15) If $5^{x-3} = 1$, then $(2X)^2$ equals
- a) 36 b) 9 c) 4 d) 3
- 16) $(\sqrt{3} + \sqrt{2})^9 (\sqrt{3} - \sqrt{2})^9$ equals
- a) 1 b) $\sqrt{5}$ c) $\sqrt{6}$ d) 5
- 17) If $3^x = 5$, $\frac{1}{3^y} = 7$ then $3^{x+y} =$
- a) $\frac{5}{7}$ b) $\frac{7}{5}$ c) 2 d) 12
- 18) If $2^{x-1} \times 3^{1-x} = \frac{9}{4}$ then X =
- a) -3 b) -1 c) 1 d) 3
- 19) The numerical value of the expression $\frac{2^{2n+1} \times 5^{2n+1}}{10^{2n}}$
- a) $\frac{1}{10}$ b) 7 c) 10 d) 100
- 20) The expression: $(5^{x+2} - 5^{x+1}) \div 5^x$
- a) 5 b) 10 c) 15 d) 20
- 21) The expression: $\frac{3^x \times 3^x \times 3^x}{3^x + 3^x + 3^x}$
- a) 3^{2x-1} b) 3^{1-2x} c) 3^{x^3-3x} d) 3^3



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(4) Answer the following questions:

1) Find the value of the following in the simplest form:

1) 3^{-1}

2) $\left(\frac{1}{4}\right)^{-1}$

3) $\left(\frac{3}{2}\right)^{-3}$

4) $(\sqrt{5})^4$

5) $(-\sqrt{3})^{-2}$

6) $(\sqrt[3]{7})^{-3}$

7) $\left(\frac{-1}{\sqrt{2}}\right)^6$

8) $(0.01)^{-2}$

9) $\left(-\frac{\sqrt{2}}{2}\right)^{-4}$

2) Find the value of each of the following in simplest form:

1) $(\sqrt{3})^{-2}$

2) $(-\sqrt[3]{4})^{-3}$

3) $\left(\frac{1}{\sqrt{2}}\right)^{-3}$

4) $\left(\frac{\sqrt{3}}{3}\right)^{-5}$

5) $(\sqrt{3})^{-4} \times (-\sqrt{2})^4$

6) $\left(\frac{1}{\sqrt{3}}\right)^5 \div \left(\frac{1}{\sqrt{3}}\right)^7$

3) Simplify:

1) $(\sqrt{2})^2 \times (\sqrt{2})^4$

2) $(-\sqrt{5})^9 \div (-\sqrt{5})^5$

3) $(\sqrt{2})^4 \times (\sqrt{3})^4$

4) $\left((\sqrt{3})^2 \times (-\sqrt{2})^3\right)^2$

5) $\left(\frac{2\sqrt{2}}{3\sqrt{3}}\right)^4$

6) $\frac{(\sqrt{3})^7 \times (\sqrt{3})^8}{(\sqrt{3})^6}$

4) Simplify each of the following in simplest form:

1) $\frac{(\sqrt{3})^{-5} \times (\sqrt{3})^{-4}}{(\sqrt{3})^{-10}}$

2) $\frac{(10)^2 \times (10)^{-7}}{(0.1)^2 \times 0.001}$

3) $\frac{(\sqrt{2})^5 \times (3)^{-2}}{3 \times (\sqrt{2})^9}$

4) $\frac{(\sqrt{3})^{-3} \times (\sqrt{2})^{-4}}{(\sqrt{2} \times \sqrt{3})^{-5}}$

5) If $X = 3$, $Y = \sqrt{2}$ find in the simplest form the value of each of the following:

a) $X^{-2} Y^{-4}$

b) $(X^{-2} \times Y^4)^{-2}$

c) $\left(\frac{X}{Y}\right)^{-3}$



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6) If $X = \frac{\sqrt{3}}{2}$, $Y = \frac{1}{\sqrt{3}}$, $Z = \frac{\sqrt{2}}{2}$. Find the value of: $X^2 + (XZ)^2 \times Y^2$

7) If $X = 2$, $Y = \sqrt{3}$ find in the simplest form the value of :

i) $(X + Y)^4 (X - Y)^4$ ii) $\left(\frac{X+Y}{X-Y}\right)^{-2}$

8) If: $a = \frac{1}{\sqrt{2}}$, $b = -1$ find the value of $7a^6 + (1 - b)^{-3}$

9) If $a = \sqrt{3}$, $b = \sqrt{2}$ find the value of :

i) $a^4 - b^4$ ii) $\frac{a^4}{b^4}$

10) If $X = 2\sqrt{2}$, $Y = 3$ find the value of: $(X^2 - Y^2)^3$

11) If: $\left(\sqrt{\frac{3}{2}}\right)^x = \frac{4}{9}$ find the value of $\left(\frac{2}{3}\right)^{x+1}$

12) If $X = \frac{\sqrt{3}}{2\sqrt{5}}$, $Y = \frac{1}{\sqrt{2}}$ prove that: $5X^2 + Y^4 = 1$

13) If $X = 2\sqrt{3}$, $Y = \frac{4}{\sqrt{2}}$ prove that: $\sqrt{X^2 + Y^4} + 3 = 9$

14) Find the value of X in each of the following:

1) $2^x = 32$

2) $2^{x-3} = 1$

3) $3^{x-2} = 81$

4) $(\sqrt{3})^{x-1} = 9$

5) $3^{x-2} = \frac{1}{9}$

6) $\left(\frac{2}{5}\right)^{2x-1} = \frac{8}{125}$

15) Prove that: $\frac{(27)^{x-1} \times 8^x}{(2\sqrt{2})^{2x} \times (3\sqrt{2})^{2x}} = \frac{1}{27}$

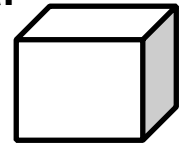
16) If $\frac{8^x \times 9^x}{(18)^x} = 64$ find the value of $(4)^{-x}$

17) Simplify: $\frac{4^{x+1} \times 9^{2-x}}{6^{2x}}$ then calculate its value at $x = 1$



18) If the total area of a cube equals 3.375×10^2 unit area:

- Find the length of the cube edge
- The volume of the cube



19) If $V = \frac{4}{3} \pi r^3$ is a rule volume of a sphere V of radius r, find

radius of a sphere of volume = 3.8808×10^4 (consider $\pi = \frac{22}{7}$)

Probability

First: Complete:

- If the probability that a student succeeds in a subject is 0.8, then the probability of his failure is
- In an experiment of throwing a die once, the probability of getting a number 7 equals.
- There are 21 boys and 15 girls in a classroom a student is chosen at random, then the probability that the student is a boy
- In an experiment of throwing a coin once the probability of appearance head equal the probability of appearance a tail then the probability of appearance head equals
- A bag contains 10 cards numbered from 1 to 10. A card is chosen at random then the probability that the number on this card is a prime number equals
- In an experiment of throwing a die, the probability of getting a number doesn't equal (2) is



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- 7) If the probability that the student go to school on foot equals twice the probability that student go to school using transportation then the probability that the student go to school using transportation equals
- 8) A class has 40 students, 20 play football, 10 play basketball and 6 play volleyball, a student is chosen at random then the probability of chosen a student does not play any of the three sports
- 9) A factory produce 200 lamps every day if the probability that the lamp is defect is 0.03, then the number of the good lamps equals
- 10) A team played 30 matches; the probability that the team win is 0.5 and the probability of a drawn is 0.3 then the expected number of matches that the team losses is
- 11) A bag contains 10 apples, 5 red , 3 green and 2 yellow, one apple is chosen at random then the probability that apple is not red equals
- 12) If the probability of getting a certain result in a random experiment is 0.4 and if the experiment is carried 100 times, then the number of getting this result is
- 13) A teacher asked the pupils to draw a triangle if the probability of drawing a triangle according to their angles is equals then the probability of the drawing an obtuse triangle is



Second: Choose the correct answer:

- 1) Which of the following may be equal the probability of an event
a) - 0.73 b) 1.23 c) 79% d) $\frac{4}{3}$
- 2) A die is thrown once then the probability appearance 5 on the upper face
a) $-\frac{5}{6}$ b) zero c) $\frac{1}{6}$ d) $\frac{5}{6}$
- 3) A coin is tossed 500 time, then the nearest expected number for appearance a head equals
a) 240 b) 252 c) 249 d) 260
- 4) A die is thrown then the probability of appearance number 7 is
a) zero b) $\frac{1}{7}$ c) $\frac{1}{6}$ d) 1
- 5) A die is thrown once, then the probability of appearance odd prime number is
a) zero b) $\frac{1}{6}$ c) $\frac{1}{3}$ d) $\frac{1}{2}$
- 6) If the probability that a student succeeds in a subject is 80%, then the probability of his failure is
a) 0.08 b) 0.02 c) 0.2 d) 0.8
- 7) In a race between two players if the probability that the first wins is 0.75 then the probability that the second wins is
a) zero b) 0.25 c) 0.75 d) 1
- 8) A bag contains 100 cards numbered from 1 to 100 then the probability that chosen of an even number =
a) 0.5 b) 1 c) zero d) 0.75



Algebra

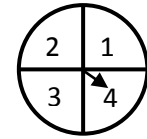
2nd Preparatory

- 9) A class contains 15 boys, 20 girls, if a student is absent, then the probability that the absent student is a boy
- a) $\frac{2}{7}$ b) $\frac{3}{7}$ c) $\frac{4}{7}$ d) $\frac{5}{7}$
- 10) A bag contains 10 balls 4 white balls, 5 red balls and the rest are black if a ball is drawn randomly then the probability of the drawn ball is black
- a) 0.1 b) 0.2 c) 0.4 d) 0.5
- 11) If the probability that a student solve a problem is 0.7 then the expected number of problems he should solve from 20 problem is
- a) 7 b) 10 c) 14 d) 20
- 12) A class contains 36 students, and the probability that a student of age less than 13 years is $\frac{1}{6}$ then the number of students of ages less than 13 years equals
- a) 20 b) 24 c) 30 d) 32
- 13) A class contains 50 students is chosen at random if the probability that the chosen student is a girl equals 0.4 then the number of boys equals
- a) 50 b) 40 c) 30 d) 20
- 14) A box contains 2 white balls, 3 red balls and 5 black balls if a ball is drawn at random then the probability that the drawn ball is not red equals
- a) 0.2 b) 0.3 c) 0.5 d) 0.7



Algebra

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15) The opposite figure a spinner game:

The probability that the pointer stop at a number is greater than 2

- a) 25% b) 50% c) 75% d) 100%

16) In a mixed school, there are 900 students, a random sample formed from 150 students is selected it found that the number of girls equals 70 then the expected number of girls in the school equals

- a) 400 b) 420 c) 480 d) 500

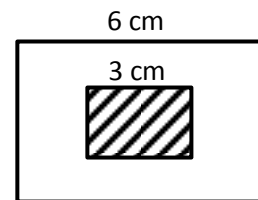
17) The probability that a player hits the target is 0.8 then the number of missing the target if the experiment is repeated 10 times

- a) 8 b) 2 c) 1 d) zero

18) A box contains a balls colored red, green and blue if the box contains 15 blue balls and if the probability of drawn it is $\frac{1}{3}$ then the number of the balls in the box is

- a) 5 b) 15 c) 30 d) 45

19) A person shoot at a picture in the opposite figure then the probability of hitting the shaded part equals



- a) $\frac{1}{4}$ b) $\frac{1}{3}$ c) $\frac{1}{2}$ d) $\frac{3}{4}$

20) A spinner game is divided into two not equal parts X, Y the pointer rotate 200 times it stopped 47 times in part X which of the following shape indicated pointer to X

- a) b) c) d)



Third: Essay questions:

1) The following table shows the experiment of chosen a number from the numbers 2, 6, 9 and the results as in the table

The number	2	6	9
Probability	0.3	0.5	X

- i) Find the value of X.
- ii) Calculate the probability of the chosen:
- a) even number b) odd number c) prime number
- 2) A box contains 3 red balls, 4 yellow balls and 5 green balls a ball is drawn randomly find the probability of the drawn ball
- a) yellow b) green c) not red
- 3) A die is thrown once find the probability of the following:
- a) appearance of a prime number.
- b) appearance of odd number.
- c) appearance number zero.
- d) appearance a number between zero and
- 4) A bag contains balls labeled by the numbers from 1 to 15 if a ball is drawn at random find the probability of each of the following:
- a) carries an even number.
- b) carries a number divisible by 3
- c) carries prime number.



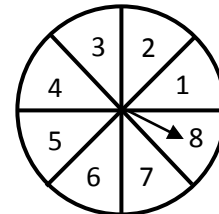
- 5) A set of cards number numbered from 1 to 24, a card is chosen randomly from this group find the probability of each of the following:
- The drawn card carries number multiple of 6.
 - The drawn card carries a prime number.
 - The drawn card carries a complete perfect square number.

6) The following table shows the evaluation of 50 students:

Estimate	Excellent	Very	Good	Pass	Fail
Number	6	9	11	16	8

A student is chosen at random. Find the probability of the following:

- Excellent
 - Fail
 - less than good
- 7) In the opposite figure represent a spinner game which its circle divided to 8 equals parts . Find the probability that the pointer stops at the part carry



- An even number.
 - A prime number
 - A number not perfect square.
- 8) In producing 600 electric lamps 36 lamps were found defected if a lamp is drawn at random what the probability that the drawn lamp is:
- defective
 - not defective



9) The following table shows the results of a survey of a favorite transportation means to go to school:

Transportation	On foot	Private car	Bus	Bicycle
Number of students	66	12	3	19

A student selected randomly find the probability of choosing:

- 1) private car 2) on foot walker 3) a bicycle not used

10) The following table shows the all recording of 150 persons on communication office:

Calling time	Less than 3 min.	3 - 6 min.	6 - 9 min.	More than 9 min.
Number of persons	100	25	20	5

Find the probability that a person talk about:

- a) less than 3 minutes b) between 3 to 6 minutes
c) more than 9 minutes. d) at least 3 min

11) A garment factory in the tenth of Ramadan city produce 6000 units daily as a sample of 100 units was examined, 20 defective units were found calculate the number of defective units.

12) A calculator manufacturing company examined randomly electronic circuits as a sample of 200 units the defective production was 6%

- i) How many units are out of order in this sample.
ii) If the production in one month was 1500 units how many units are functional units of marketing.



- 13) In a fruit packing project 30% of fruits is not suitable for exporting because the size is too small how many tons can be exported in 10 days if 20 tons fruits are produced daily.
- 14) A bag contains 32 coloured balls of the same kind and the same volume, some of them are white, some are red, some are green, the rest are yellow, if the probability of drawn a red ball is $\frac{3}{8}$, how many red balls are there in this bag?
- 15) In a general league matches the probability that one team wins is 0.6, probability of a drawing is 0.3, if the team will play 30 matches, find the expected number of matches that the team losses.
- 16) A box contains number of symmetrical cards, some of them are red and the other are blue, 5 pupils draw a card, register its colour, then return it to the box and all of them repeat the same work 14 times, then register the following results in the following table:

The pupils the colour	First	Second	Third	Fourth	Fifth	Total
Red	10	6	2	14	10	42
Blue	4	8	12	0	4	28
Total	14	14	14	14	14	70

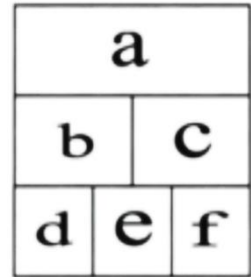
- a) If a card is chosen randomly, find the probability that this card is blue.
- b) Find the expected number of the red card if the number of all cards in the box is 100.



Algebra

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17) In the playing of target and arrow, if the target is a squared form and it is divided into the shown regions and the player was asked to shoot the arrow at the target without laying in a determined region.



- Find the probability that the arrow hits region b.
- Find the probability that the arrow hits the region which consists of b, c together.

18) The following table shows the evaluation of October for second form preparatory according to the scores of the students

Excellent	Very good	Good	Pass	Weak
6	9	12	6	3

- Find the probability of getting a score of Good.
- Find the expected number of students whose scores is Pass if the test is carried on 120 students.



Model Answers

Part (1)

(1) Complete the following:

1) $2a^2$, 6

3) 5 , $3X^2$, $13X$

5) b , a , $7ab$

7) 2 , $X + 4$

9) $(X + Y)^2$

11) $(7X - 5Y)$, $70XY$

13) 9 , $7X$, $7X$

15) $2a$, $2ab$, b^2

17) 2 , -2 , 14 , -14

19) $\pm 220 X$

21) 7

23) 1

25) -19

27) -42

28) $(X + \frac{1}{X})^2 = 25$

$$X^2 + \frac{1}{x^2} = 25 - 2 = 23$$

29) $\frac{X^2}{4}$

31) 1

33) ± 1

35) $X + 5$

37) $X^2 - 5X + 25$

2) 5 , $2X^2$, $7X$

4) X , $7XY$, $6Y^2$

6) 1 , 2

8) 8 , 2 , X^2 , $2X$

10) 3 , $25a^2$, 9

12) 7 , $(11X + 7Y)$

14) 1

16) $12XY$, $3Y$, $2X$

18) 9

20) 25

22) -2

24) 1

26) $\pm 8X$

30) $X + 5$

32) \emptyset

34) $(X + L)(Y - Z)$

36) 3

38) 15



Algebra

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2) Choose the correct answer:-

1) 49

3) $a^3 - 1$

5) ± 24

7) 9

9) 3

11) 4

13) 16

15) 4

17) $X^3 - 8Y^3$

19) 35

21) ± 5

23) 14

25) $- 3X$

27) 2

29) 4

31) 5

33) $x - 3$

2) $(X - 2) (X + 2)$

4) 1

6) 9

8) 4

10) 3

12) 1

14) 8

16) 3

18) 4

20) $(X + Z) (Y + 3)$

22) 4

24) $4X^2 + 6XY + 9Y^2$

26) ± 6

28) 6

30) $\{ 1 \}$

32) 7

34) $x^2 - y^2$

35) 25

3) Factorize each of the following:

1) $(X - 8) (X + 1)$

3) $(2Y + 5) (Y - 1)$

5) $(2X - 5) (2X - 5)$

7) $X (25X^2 - 10Y + Y^2)$

$= X (5X - Y) (5X - Y)$

9) $15a^2 - 19 ab + 6b^2$

$= (3a - 2b) (5a - 3b)$

10) $(3X - 2Y) (2X - 3Y)$

11) $(5a - 1) (5a + 1)$

2) $(Y - 7) (Y - 7)$

4) $(3X - 3) (X - 4)$

6) $(X^3 - 8) (X^3 - 1)$

8) $(XY - 25) (XY + 1)$



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$$12) 5XY (5X - 3 + 7)$$

$$5XY (5X + 4)$$

$$13) (4X^2 - 9) (4X^2 + 9)$$

$$= (2X - 3) (2X + 3) (4X^2 + 9)$$

$$14) (X + 4Y) (X^2 - 4XY + 16Y^2)$$

$$15) X^3 - 27$$

$$(X - 3) (X^2 + 3X + 9)$$

$$16) \left(\frac{X}{2} - \frac{Y}{7}\right) \left(\frac{X}{2} + \frac{Y}{7}\right)$$

$$17) 3X^3 Y^2 (4Y^2 + X^2)$$

$$18) 2X (4X^2 - Y^2)$$

$$= 2X (2X - Y) (2X + Y)$$

$$19) \frac{1}{8} XY (16Y^2 - X^2)$$

$$= \frac{1}{8} XY (4Y - X) (4Y + X)$$

$$20) 2XY (X^2 - 4Y^2)$$

$$= 2XY (X - 2Y) (X + 2Y)$$

$$21) \frac{3}{4} X^3 - 48 \quad \left(X \frac{4}{3}\right)$$

$$= X^3 - 64$$

$$= (X - 4) (X^2 - 4X + 16)$$

$$22) (0.3a - 0.1b) (0.09 a^2 + 0.03ab + 0.01b^2)$$

$$23) ((a + b) + c) ((a + b)^2 - (a + b)c + c^2)$$

$$24) (a - 2b) ((a - 2b)^2 - 4)$$

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

$$25) 2 (1 - (X - 1)^3)$$

$$2 (1 - (X - 1) (X + X + 1))$$



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$$26) (Y^3 - Y^2) - (9Y - 9)$$

$$= Y^2 (Y - 1) - 9 (Y - 1)$$

$$= (Y^2 - 9) (Y - 1)$$

$$(Y + 3) (Y - 3) (Y - 1)$$

$$27) (a^3 - ab^2) - (a^2b - b^3)$$

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

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

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

$$28) X^3 - 3X^2 - 6X + 8$$

$$= X^3 + 8 - 3X (X + 2)$$

$$= (X + 2) (X^2 - 2X + 4) - 3X (X + 2)$$

$$= (X + 2) (X^2 - 2X + 4 - 3X)$$

$$= (X + 2) (X^2 - 5X + 4)$$

$$= (X + 2) (X - 4) (X - 1)$$

$$29) (4X^2 - 4XY + Y^2) - 16$$

$$= (2X - Y)^2 - 16$$

$$= (2X - Y - 4) (2X - Y + 4)$$

$$30) (3X^3 - 2X^2) + (12X - 8)$$

$$= X^2(3X - 2) + 4(3X - 2)$$

$$= (X^2 + 4) (3X - 2)$$

$$31) 25X^2 - 20X + 4 - 4X - 5$$

$$= 25X^2 - 24X - 1$$

$$= (25X + 1) (X - 1)$$

$$32) X^2 + X - 6 - 6X$$

$$= X^2 - 5X - 6$$

$$= (X - 6) (X + 1)$$



$$\begin{aligned} 33) & 50 - 2(4X^2 + 4X + 1) \\ & = 2(25 - (2X + 1)^2) \\ & = 2(5 - (2X + 1)(5 + (2X + 1))) \\ & = 2(5 - 2X + 1)(5 + 2X + 1) \\ & = 2(4 - 2X)(2X + 6) \\ & = 8(2 - X)(X + 3) \\ 34) & 5Y^2 - 28X - 12Y^2 \\ & = (5Y - 2X)(Y + 6X) \end{aligned}$$

(4) Answer the following question:

$$\begin{aligned} 1) & (23.5 - 18.5)(23.5 + 18.5) = 5 \times 22 = 110 \\ 2) & 2[(26.18)^2 - (23.82)^2] \\ & = 2(26.18 - 23.82)(26.18 + 23.82) = 2 \times 2.36 \times 50 = 236 \\ 3) & a^2 - 4b^2 + 5b^2 \\ & = a^2 + b^2 \\ 4) & (X^2 - 9)(2X - 3) = (X - 3)(X + 3)(2X - 3) \\ 5) & (2a - b)^2 + (a + 2b)(a - b) \\ & 4a^2 - 4ab + b^2 + a^2 - ab + 2ab - 2b^2 \\ & = 5a^2 - 3ab - b^2 \\ & = 5X(1)^2 - 3 \times 1 \times 2 - (2)^2 = 5 - 6 - 4 = \boxed{-5} \\ 6) & (2X - 3Y)^2 + (3X - 1)(3X + 1) \\ & 4X^2 - 12XY + 9Y^2 + 9X^2 - 1 \\ & = 13X^2 - 12XY + 9Y^2 - 1 \\ 7) & 2a^2 + 4ab - 3ab - 6b^2 + a^2 - 2b^2 \\ & = 3a^2 + ab - 8b^2 \\ 8) & 4Y^2 + y - 14 = (Y + 2)(4Y - 7) \end{aligned}$$



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$$9) 15a^2 + 17ab - 4b^2 = (3a + 4b) (5a - b)$$

$$10) (25 - 15) (25 + 15) = 40X$$

$$10 \times 40 = 40X$$

$$X = 10$$

$$11) a(X + Y) - 2b(X + Y) = (X + Y)(a - 2b)$$

$$= 7 \times 4 = 28$$

$$12) (X - Y)(X + Y)(X^4 - 2X^2Y^2 + Y^4)$$

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

$$13) \left(X + \frac{1}{x}\right)^2 = 25 \qquad X^2 + \frac{1}{x^2} = 23$$

$$X^2 + \frac{1}{x^2} + 2 = 25$$

$$14) \left(X + \frac{1}{x}\right)^2 = X^2 + \frac{1}{x^2} + 2$$

$$= 34 + 2 = 36$$

$$\therefore X + \frac{1}{x} = \sqrt{36} = 6$$

(15) Find in R the S.S of the following equations:

a) $x^2 - 4x = 0$

$$x(x - 4) = 0$$

$$\text{S.S} = \{ 0, 4 \}$$

b) $(2x - 3)(2x + 3) = 0$

$$\text{S.S} = \left\{ \frac{3}{2}, -\frac{3}{2} \right\}$$

c) $(4x^2 - 9)(4x^2 + 9)$

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

$$\text{S.S} = \left\{ \frac{3}{2}, -\frac{3}{2} \right\}$$



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d) $(x - 4)(x + 3) = 0$

$$S.S = \{ 4 , -3 \}$$

e) $-(x + 1)^2 = -9$

$$(x + 1)^2 = 9$$

$$x + 1 = 3$$

$$x + 1 - 3 = 0 \rightarrow x - 2 = 0$$

$$S.S = \{ 2 \}$$

f) $-(x + 3)(x - 2) = 0$

$$S.S = \{ -3 , 2 \}$$

g) $(4x - 1)(x + 3) - (x + 5)^2 + 4 = 0$

$$4x^2 + 12x - x - 3 - (x^2 + 10x + 25) + 4 = 0$$

$$4x^2 + 12x - x - 3 - x^2 - 10x - 25 + 4 = 0$$

$$3x^2 + x - 24 = 0$$

$$(3x - 8)(x + 3) = 0$$

$$S.S = \left\{ \frac{8}{3} , -3 \right\}$$

h) $x^2 - x = 56$

$$x^2 - x - 56 = 0$$

$$(x + 7)(x - 8) = 0$$

$$S.S = \{ -7 , 8 \}$$

k) $x^2 - 2x + 1 = 0$

$$(x - 1)(x - 1) = 0$$

$$S.S = \{ 1 \}$$



Part (2)

(1) Answer the following questions:

1)

2) A. of rectangle = $(x + 1)(x + 5) = x^2 + 6x + 5$

P. of rectangle = $[x + 1 + x + 5] \times 2 = [2x + 6] \times 2$
 $= 4x + 12$

3) A. of square = $(5a + b)(5a + b)$

$$= 25a^2 + 10ab + b^2$$

$$= 25 \times 2^2 + 10 \times 2 \times 3 + 3^2$$

$$= 100 + 60 + 9 = 169$$

4) Let the two number be $s, x + 2$

$$x^2 + (x + 2)^2 = 100$$

$$x^2 + x^2 + 4x + 4 = 100$$

$$x^2 + 2x + 2 = 100 \div 2 = 50$$

$$x^2 + 2x + 2 - 50 = 0$$

$$x^2 + 2x - 48 = 0$$

$$(x - 8)(x + 6) = 0$$

$$x = 8 \quad \text{or} \quad x = -6 \text{ refused}$$

$$\therefore x = \boxed{8}, \quad x + 2 = \boxed{10}$$



5) Let width be x and length $x + 3$

$$A = x(x + 3) = 28$$

$$x^2 + 3x = 28$$

$$x^2 + 3x - 28 = 0$$

$$(x + 7)(x - 4) = 0$$

$$x = -7 \text{ refused or } x = 4$$

$$\therefore \text{width} = 4 \text{ cm}$$

$$\text{length} = 4 + 3 = 7 \text{ cm}$$

6) Let the number be $2x$, $3x$

$$(2x)(3x) - 2(3x) = 12$$

$$6x^2 - 6x = 12$$

$$6x^2 - 6x - 12 = 0$$

$$6(x^2 - x - 2) = 0$$

$$x^2 - x - 2 = 0$$

$$(x - 2)(x + 1) = 0$$

$$x = 2, x = -1 \text{ refused}$$

$$\therefore L = 3x = 3 \times 2 = 6 \text{ cm}$$

$$w = 2x = 2 \times 2 = 4 \text{ cm}$$

7) as no. (5)

8) A. of square = x^2

$$\text{A. of rectangle} = 2x$$

$$x^2 + 2x = 15$$

$$x^2 + 2x - 15 = 0$$

$$x = -5 \text{ refused or } x = 3$$

$$\therefore \text{P. of square} = 5 \times 4 = 12 \text{ cm}$$



Algebra

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(2) Complete:

1) $\frac{1}{2\sqrt{2}}$

2) 5

3) $\frac{9}{4}$

4) 2

5) 4

6) 8

7) $(-\sqrt{11})^{24}$

8) zero

9) 1

10) 20

11) 1

12) -1

13) $1 + x^2$

14) 1

15) 2

16) $2^{-5} \div (2^2)^{-3} = 2^{-5} \div 2^{-5} = 2^{\text{zero}} = \boxed{1}$

17) $3^{-6} \div 3^{-6} \times (-2)^{-1} = 1 \times -\frac{1}{2} = -\frac{1}{2}$

18) $(2)^7 \div 1 = 2^7$

19) $3 \times 3^x = 1$

$3^{x+1} = 3^0$ then $x = -1$

20) $\frac{2^x \times 3^x}{2^{2x} \times 3^x} = 2^{x-2x} = 2^{-1}$

$-x = -1 \rightarrow \boxed{x = 1}$

(3) Choose:

1) c

2) a

3) c

4) c

5) c

6) a

7) b

8) d

9) a

10) d

11) c

12) b

13) c

14) a

15) a

16) a

17) a

18) b

19) c

20) d

21) a



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(3) Answer the following question:

(1) 1) $\frac{1}{3}$ 2) 4 3) $\frac{8}{27}$ 4) 25 5) $\frac{1}{9}$
 6) $\frac{1}{7}$ 7) $\frac{1}{8}$ 8) $\frac{1}{0.0001}$ 9) $\frac{16}{4} = 4$

(2) 1) $\frac{1}{9}$ 2) $-\frac{1}{4}$ 3) $2\sqrt{2}$
 4) $\left(\frac{3}{\sqrt{3}}\right)^5 = \frac{243}{9\sqrt{3}} = \frac{27}{\sqrt{3}}$ 5) $\frac{4}{9}$ 6) 9

(3) Simplify:

1) $(\sqrt{2})^6 = 2^3 = 8$ 2) $(-\sqrt{5})^4 = 5^2 = 25$
 3) 4×9 4) $(3)^2 \times (-2\sqrt{2})^2 = 9 \times 8 = 72$
 5) $\frac{16 \times 4}{81 \times 9} = \frac{64}{729}$ 6) $\frac{(\sqrt{3})^{15}}{(\sqrt{3})^6} = (\sqrt{3})^9 = 81\sqrt{3}$

(4) Simplify each of the following in simplest form:

1) $\frac{(\sqrt{3})^{-9}}{(\sqrt{3})^{-10}} = \sqrt{3}$
 2) $\frac{(10)^{-5}}{(0.1)^2 \times (0.1)^3} = \frac{(10)^{-5}}{(0.1)^5}$
 $= (10)^{-5} \times (10)^5 = (10)^{\text{zero}} = 1$
 3) $(\sqrt{2})^{-4} \times (3)^{-3} = \frac{1}{4 \times 27} = \frac{1}{108}$
 4) $(\sqrt{3})^2 \times (\sqrt{2})^1 = 9\sqrt{2}$
 (5) a) $(3)^{-2} \times (\sqrt{2})^{-4} = \frac{1}{9 \times 4} = \frac{1}{36}$
 b) $\left((3)^{-2} \times (\sqrt{2})^4\right)^{-2} = (3)^4 \times (\sqrt{2})^{-8} = \frac{81}{16}$
 c) $\left(\frac{3}{\sqrt{2}}\right)^{-3} = \left(\frac{\sqrt{2}}{3}\right)^3 = \frac{2\sqrt{2}}{27}$



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$$(6) \left(\frac{\sqrt{3}}{2}\right)^2 + \frac{\sqrt{3}}{2} \times \frac{\sqrt{2}}{2} \times \left(\frac{1}{\sqrt{3}}\right)^2$$

$$\frac{3}{4} + \frac{\sqrt{6}}{12} = \frac{9 + \sqrt{6}}{12}$$

$$(7) \text{ i) } (2 + \sqrt{3})^4 (2 - \sqrt{3})^4$$

$$[(2 + \sqrt{3})(2 - \sqrt{3})]^4 = [4 - 3]^4 = 1$$

$$\text{ii) } \left(\frac{2 + \sqrt{3}}{2 - \sqrt{3}}\right)^{-2}$$

$$= \frac{(2 - \sqrt{3})^2}{(2 + \sqrt{3})^2} = \frac{4 - 2\sqrt{3} + 3}{4 + 2\sqrt{3} + 3} = \frac{7 - 2\sqrt{3}}{7 + 2\sqrt{3}}$$

$$(8) 7 \times \left(\frac{1}{\sqrt{2}}\right)^6 + (1 + 1)^{-3}$$

$$\frac{7}{8} + \frac{1}{8} = \frac{8}{8} = 1$$

$$(9) \text{ i) } (\sqrt{3})^4 - (\sqrt{2})^4 = 9 - 4 = 5$$

$$\text{ii) } \frac{(\sqrt{3})^4}{(\sqrt{2})^4} = \frac{9}{4}$$

$$(10) \left((2\sqrt{2})^2 - (3)^2\right)^3$$

$$(8 - 9)^3 = -1$$

$$(11) \left(\frac{\sqrt{3}}{\sqrt{2}}\right)^x = \left(\frac{\sqrt{3}}{\sqrt{2}}\right)^{-4}$$

$$\left(\frac{2}{3}\right)^{x+1} = \left(\frac{2}{3}\right)^{-4+1} = \left(\frac{2}{3}\right)^{-3} = \frac{27}{8}$$



Algebra

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$$(12) \quad 5 \left(\frac{\sqrt{3}}{2\sqrt{5}} \right)^2 + \left(\frac{1}{\sqrt{2}} \right)^4$$

$$= 5 \times \frac{3}{20} + \frac{1}{4}$$

$$\frac{3}{4} + \frac{1}{4} = \frac{4}{4} = 1$$

$$(13) \quad \sqrt{(2\sqrt{3})^2 + \left(\frac{4}{\sqrt{2}}\right)^4 + 3}$$

$$= \sqrt{12 + 64 + 3} = \sqrt{79}$$

(14) Find the value of X in each of the following:

1) $x = 5$

2) $x = 3$

3) $x = 6$

4) $x = 5$

5) $x = 0$

6) $x = 2$

$$(15) \quad \frac{(3^3)^{x-1} \times (2^3)^x}{2^{2x} \times (\sqrt{2})^{2x} \times 3^{2x} \times (\sqrt{2})^{2x}}$$

$$= \frac{3^{3x-3} \times 2^{3x}}{2^{2x} \times 2^x \times 3^{2x} \times 2^x}$$

$$= 3^{3x-3-2x} \times 2^{3x-2x-x-x}$$

$$= 3^{x-3} \times 2^{-x}$$

$$(16) \quad \frac{2^{3x} \times 3^{2x}}{2^x \times 3^{2x}} = 64$$

$$= 2^{3x-x} \times 3^0$$

$$= 2^{2x} = 2^6$$

$$= \boxed{x = 3} \rightarrow 4^{-x} = 4^{-3} = \frac{1}{64}$$

$$(17) \quad \frac{(2^2)^{x+1} \times (3^2)^{2-x}}{2^{2x} \times 3^{2x}}$$

$$= 2^{2x+2-2x} \times 3^{4-2x-2x}$$

$$= 2^2 \times 3^{4-4x} = 4 \times 3^{4-4} = \boxed{4}$$



(18) The total area of cube = $\ell^2 \times 6 = 3.375 \times 10^2$

$$\ell = \sqrt{3.375 \times 10^2 \div 6} = 7.5 \text{ cm}$$

The volume = $\ell^3 = (7.5)^3 = 421.9 \text{ cm}^3$

(19) $v = \frac{4}{3} \times \frac{22}{7} \times r^3 = 3.8808 \times 10^4$

$$r^3 = 3.8808 \times 10^4 \times \frac{3}{4} \times \frac{7}{22}$$

$$r = \sqrt[3]{9.261} = 3.04 \text{ cm}$$

Probability

First: Complete:

1) $\frac{2}{10} = \frac{1}{5}$

2) zero

3) $\frac{21}{36}$

4) $\frac{1}{2}$

5) $\frac{2}{5}$

6) $\frac{5}{6}$

7) $\frac{1}{3}$

8) $\frac{1}{10}$

9) 14 lamps

10) 6

11) $\frac{1}{2}$

12) 40

13) zero

Second: Choose the correct answer:

1) c

2) d

3) c

4) a

5) c

6) c

7) b

8) a

9) b

10) a

11) c

12) b

13) c

14) d

15) a

16) b

17) b

18) d

19) c

20) c



Algebra

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Third:

- (1) i) 0.2 ii) a) 0.8 b) 0.2 c) 0.3
- (2) a) $\frac{4}{12} = \frac{1}{3}$ b) $\frac{5}{12}$ c) $\frac{9}{12} = \frac{3}{4}$
- (3) a) $\frac{1}{2}$ b) $\frac{1}{2}$ c) zero
- (4) a) $\frac{7}{15}$ b) $\frac{3}{15} = \frac{1}{5}$ c) $\frac{6}{15}$
- (5) a) $\frac{4}{24} = \frac{1}{6}$ b) $\frac{9}{24} = \frac{3}{8}$ c) $\frac{3}{24} = \frac{1}{8}$
- (6) a) $\frac{6}{50} = \frac{3}{25}$ b) $\frac{8}{50} = \frac{4}{25}$ c) $\frac{24}{50} = \frac{12}{25}$
- (7) a) $\frac{1}{2}$ b) $\frac{4}{8} = \frac{1}{2}$ c) $\frac{7}{8}$
- (8) a) $\frac{36}{600} = \frac{6}{100} = \frac{3}{50}$
b) $\frac{64}{600} = \frac{2}{25}$
- (9) 1) $\frac{12}{100} = \frac{6}{50}$ 2) $\frac{66}{100} = \frac{33}{50}$ 3) $\frac{81}{100}$
- (10) a) $\frac{1}{2}$ b) $\frac{25}{200} = \frac{1}{8}$ c) $\frac{5}{200} = \frac{1}{40}$ d) $\frac{100}{200} = \frac{1}{2}$
- (12) i) 12 ii) 1400
- (13) Number of tons daily = $\frac{70}{10} \times 20 = 14$ ton
Number of tons in 10 days = $14 \times 10 = 140$ ton
- (14) Number of red balls = $\frac{3}{8} \times 32 = 12$ ball
- (15) $\frac{1}{10} \times 30 = 3$ match
- (16) a) $\frac{14}{35} = \frac{2}{5}$ b) $\frac{3}{5} \times 100 = 60$
- (17) a) $\frac{1}{6}$ b) $\frac{2}{6} = \frac{1}{3}$
- (18) a) $\frac{12}{36} = \frac{1}{3}$ b) $\frac{1}{6} \times 120 = 20$ students