



BOOKS - PEARSON IIT JEE FOUNDATION

QUADRATIC EXPRESSIONS AND EQUATIONS



1. Verify whether x = 2 is a solution of $2\pi^2 + \pi = 10 = 0$

$$2x^2 + x - 10 = 0$$



2. (a) Solve
$$x^2 - 15x + 26 = 0$$

(b) Solve $x + rac{1}{x} = rac{5}{2}.$

3. Solve equation is $x^2 - 11x + 30 = 0$ by using

formula.



4. Find the nature of the roots of the equations of

given below :

- (a) $x^2 13x + 11 = 0$
- (b) $18x^2 14x + 17 = 0$
- (c) $9x^2 36x + 36 = 0$
- (d) $3x^2 5x 8 = 0$





in terms of I and m.



6. Write the quadratic equation whose roots are
$$\frac{5}{2}$$
 and $\frac{8}{3}$.



and also its other root.



8. Solve
$$\left(x^2-2x
ight)^2-23ig(x^2-2xig)+120=0$$





9. Solve
$$\sqrt{x+65} + \sqrt{5-x} = 4$$

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10. Solve $3x^4 - 8x^3 - 6x^2 + 8x + 3 = 0$.
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11. The roots of $x^2-(a+1)x+b^2=0$ are equal .

Then choose the correct value of a, b from the

following option :

(a) $5,\,2$, (b) $3,\,4$, (c) $5,\,-3$, (d) $5,\,4$



13. Choose the minimum value of $\frac{2x^2 + 12x - 3}{1 + 18x - 3x^2}$

from the following options :

(a)
$$\frac{-15}{29}$$
, (b) $\frac{15}{28}$, (c) $\frac{-15}{28}$, (d) None of these
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Very Short
1. For the expression $ax^2 + 7x + 2$ to be quadratic,
the possible value of a are _____.
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2. The equation, $ax^2 + bx + c = 0$, can be expressed
as $a\alpha^2 + b\alpha + c = 0$, only when ' α ' is _____ of the



5. For the equation $2x^2 - 3x + 5 = 0$ sum of the
roots is
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6. The quadratic equation having roots $-a$, $-b$ is
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Watch video solution
7. A quadratic equation whose roots are 2 moe than
the vector of the supplier equation

the roots of the quadratic equation





11. x=2 is a roots of the equation $x^2-5x+6=0$

. Is the given statement true?

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12. If the equation $3x^2 - 2x - 3 = 0$ has roots α , and β then α . $\beta = _$.





18. If the sum of the roots of a quadratic equation, is positive and product of the roots is negative, the numerically greater root has _____ sign. [positive/negative]

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19. If x = 1 is a solution of the quadratic equation

 $ax^2 - bx + c = 0$, then b is equal to _____.

Short Ans

1. Factorize the following quadratic expressions :

- (a) $x^2 + 5x + 6$
- (b) $x^2 5x 36$
- (c) $2x^2+5x-18$



2. Determine the nature of the roots of the following equatins :

(a) $x^3 + 2x + 4 = 0$

(b) $3x^2 - 10x + 3 = 0$

(c) $x^2 - 24x + 144 = 0$

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3. If
$$f(x)=x^2-5x-36$$
 and $g(x)=x^2+9x+20,$ then for what values of x is $2f(x)=3g(x)$?

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4. solve : $16x^4 - 28x^2 - 8 = 0$

5. For what values of m does the equation, $mx^2 + (3x - 1)m + 2x + 5 = 0$ have equal roots of opposite sign ?

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6. Find the value of m for which the quadratic equation , $3x^2 + 10x + (m - 3) = 0$ has roots which are reciproal to each other.



8. If one roots of the equation $x^2 - mx + n = 0$ is

twice the other root, then show that $2m^2=9\pi$.



9. The square of one-sixth of the number of students

in a class are studying in the library and the

remaining eight students are playing in the ground.

What is the total number of students of the class ?



10. If 2α and 3β are the roots of the equation $x^2+az+b=0$, then find the equation whose roots are a,b.

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11. If lpha,eta are the roots of the quadratic equation $lx^2+mx+n=0$,then evaluate the following

expressions.

(a)
$$\alpha^2 + \beta^2$$

(b) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$
(c) $\frac{1}{\alpha^3} + \frac{1}{\beta^3}$



12. By a reduction of re.-1 per kg in the price of sugar Mohan can buy one kg more for rs.56 . find the original price of sugar per kg ?



13. The zeroes of the quadratic polynomial $x^2 - 24x + 143$ are **Watch Video Solution**

14. Find the quadratic equation in x whose roots are

$$\frac{-7}{2}$$
 and $\frac{8}{3}$.

15. If k_1 and k_2 are roots of $x^2 - 5x - 24 = 0$, then find the quadratic equation whose roots are $-k_1$ and $-k_2$.



17. The roots of the equation $2x^2 + 3x + c = 0$ (where x < 0) could be _____.



18. The roots of the equation $3x^2 - 4\sqrt{3x} + 4 = 0$

are



19. If α and β are the roots of the quadratic equation

$$x^2+3x-4=$$
 0, then $lpha^{-1}+eta^{-1}=$ _____

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Match Mideo Colution

20. The roots of the equtation
$$rac{x-3}{x-2}+rac{2x}{x+3}=1$$
, where $x
eq 2,\ -3$ are



21. If the roots of the quadratic equation $4x^2 - 16x + p = 0$, are real and unequal, then find the value/s of p.

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22. If one root of the quadratic equation $ax^2 + bx + c = 0$ is $15 + 2\sqrt{56}$ and a, b and c are

rational, then find the quadratic equation.



23. If the roots of the equation ax² + bx + c = 0 are in the ratio of 3: 4,
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24. For which value of p among the following, does

the quadratic equation $3x^2 + px + 1 = 0$ have real

roots?



25. If the product of the roots of $ax^2 + bx + 2 = 0$

is equal to the product of the roots of

$$px^{2} + qx - 1 = 0$$
, then $a + 2p =$ _____.
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26. Find the roots of quadratic equation
 $ax^{2} + (a - b + c)x - b + c = 0.$
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27. If (2x-9) is a factor of $2x^2 + px - 9$, then

 $p = __$.



Essay Type Qns

1.
$$(x+3)(x+4)(x+6)(x+7) = 1120$$
.



2. Solve:
$$\left(x^2 - 3x\right)^2 - 16\left(x^2 - 3x\right) - 36 = 0$$

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3.
$$\sqrt{x-3}+\sqrt{3x+4}=5$$



C. Both (a) and (b)

D. Cannot be determined

Answer: C

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2. The discriminant of the equation $x^2 - 7x + 2 = 0$

is

A. 47

B.40

C. 41

D. -41



3. Find the maximum value of the quadratic expression $-3x^2 + 7x + 4$

A. 7/6

B. -7/6

C. 6/7

D. -6/7

Answer: A





- B. -3
- C. 6
- D. 3

Answer: C



5. If one of the roots of the an equation, $x^2 - 2x + c = 0$ is thrice the other, then c = ?

A.
$$\frac{1}{2}$$

B. $\frac{4}{3}$
C. $-\frac{1}{2}$
D. $\frac{3}{4}$

Answer: D



6. The number of real roots of the quadratic equation $3x^2 + 4 = 0$ is

A. 0

B.1

C. 2

D. 4

Answer: A



- 7. if lpha and eta are the roots of the equatioOn $x^2+px+q=0$ and does not have real roots then $(lpha-eta)^2$ =
 - A. $q^2 4p$
 - B. $4p^2 p$
 - $\mathsf{C}.\,p^2-4q$

D.
$$p^2+4q$$

Answer: C

8. Which of the following equations does not have real roots ?

A.
$$x^2+4x+4=0$$

B.
$$x^2 + 9x + 16 = 0$$

C.
$$x^2 + x + 1 = 0$$

D.
$$x^2+3x+1=0$$

Answer: C



9. The sum of the roots of the equation, $ax^2 + bx + c = 0$ where a, b and c are rational and whose one of the roots is $4 - \sqrt{5}$ is

A. 8

- B. $-2\sqrt{5}$
- C. $2\sqrt{5}$
- D. 11

Answer: A


10. For the quadratic equation $x^2 + 3x - 4 = 0$ which of the following is a solution ? (A) x = -4 (b) x = 3(C) x = 1A. A and B B. B and C C. A and C D. Only A

Answer: C



11. Find the quadratic equation whose roots are reciprocals of the roots of the equation $7x^2-2x+9=0.$

A.
$$9x^2-2x+7=0$$

B.
$$9x^2 - 2x - 7 = 0$$

 $\mathsf{C}.\,9x^2 + 2x - 7 = 0$

D.
$$9x^2+2x-7=0$$

Answer: A

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12. The number of real roots of the quadratic equation $(x-4)^2 + (x-5)^2 + (x-6)^2 = 0$ is

A. 1

B. 2

C. 3

D. None of these



13. The number of distinct real solution of $|x|^2 - 5|x| + 6 = 0$ is

A. 4

B. 3

C. 2

D. 1

Answer: C



14. The number of real roots of the equation $|x^2| - 5|x| + 6 = 0$ is A. 1 B. 2 C. 3 D. 4



15. In writing a quadratic equation of the form $x^2 + px + q = 0$, a student makes a mistake in writing the coefficient of x and gets the roots as 8 and 12. Another student makes mistake in writing the constant term and gets the roots as 7 and 3. Find the correct quadratic equation.

A.
$$x^2 + 10x + 96 = 0$$

B. $x^2 - 20x + 21 = 0$
C. $x^2 - 21x + 20 = 0$
D. $x^2 - 96x + 10 = 0$

Answer: A



16. The roots of the equation $6x^2 - 8\sqrt{2x} + 4 = 0$

are



Answer: C



17. Which of the following equations has roots as a,b and c ?

A.

$$x^{3} + x^{2}(a + b + c) + x(ab + bc + ca) + abc = 0$$

B.
 $x^{3} + x^{2}(a + b + c) + x(ab + bc + ca) - abc = 0$
C.
 $x^{3} - x^{2}(a + b + c) + x(ab + bc + ca) - abc = 0$
D.

$$x^3-x^2(a+b+c)-x(ab+bc+ca)-abc=0$$

Answer: C

18. If the roots of the equation $2ax^3 + (3b-9)x + 1 = 0$ are -2 and 3, then the value of a and b respec-tively are

A.
$$\frac{1}{12}$$
, $\frac{5}{18}$
B. $\frac{-1}{12}$, $\frac{-53}{18}$
C. $\frac{-1}{12}$, $\frac{-5}{8}$
D. $\frac{-1}{12}$, $\frac{55}{18}$

19. The roots of the equation $x^2+5x+1=0$ are

A.
$$\frac{5+\sqrt{21}}{2}, \frac{5-\sqrt{21}}{2}$$

B. $\frac{-5-\sqrt{21}}{2}, \frac{5+\sqrt{21}}{2}$
C. $\frac{-6+\sqrt{21}}{2}, \frac{-5-\sqrt{21}}{2}$
D. $\frac{-5+\sqrt{29}}{2}, \frac{-5-\sqrt{29}}{2}$

Answer: C

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20. If α amd β are the roots of the equation $3x^2 - 2x - 8 = 0$ then $\alpha^2 + \alpha\beta + \beta^2 =$ _____.

A.
$$\frac{76}{9}$$

B. $\frac{25}{3}$
C. $\frac{16}{3}$
D. $\frac{32}{3}$

Answer: A



21. If $2x^2 + (2p - 13)x + 2 = 0$ is exactly divisible

by x-3, then the value of



Answer: B



22. If $x^2 - ax - 6 = 0$ and $x^2 + ax - 2 = 0$ have

one common root, then a can be _____.

A. -1

B. 2

C. -3

D. 0

Answer: A





D. 0

Answer: C



24. If α and β are the zeros of the Quadratic Polynomial F(X) = $6x^2 + x - 2$, Find the Value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$

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25. The age of a father is 25 years more than his son's age. The product of their ages is 84 in year. What will be son's age in years, after 10 years ?

A. 3

B. 28

C. 13

D. 18

Answer: C

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26. If the roots of the equation $ax^2 - bx + 5c = 0$ are in the ratio of 4:5 , then

A.
$$ab=18c^2$$

$$\mathsf{B.81}b^2 = 4ac$$

 $\mathsf{C}.\,bc=a^2$

 $\mathsf{D.}\,4b^2=81ac$

Answer: D



27. The speed of Uday is $5k\frac{m}{h}$ more than that of Subash. Subash reaches his home from office 2 hours earlier than Uday. If Subash and Uday stay 12 km and 48 km from their respective Offices, find th speed of Uday.

A. 10 km/h

B. 4 km/h

C. 9 km/h

D. 8 km/h

Answer: D

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28. If roots of the

A.
$$2b^{-1} = a^{-1} + c^{-1}$$

B.
$$2c^{-1} = a^{-1} + b^{-1}$$

$$\mathsf{C}.\,2a^{-1} = b^{-1} + c^{-1}$$

D. None of these

Answer: C



29. If the roots of the quadratic equation $x^2-3x-304=0$ are lpha and eta, then the quadratic equation with roots 3lpha and 3eta is

A.
$$x^2 + 9x - 2736 = 0$$

B. $x^2 - 9x - 2736 = 0$
C. $x^2 - 9x + 2736 = 0$

D. $x^2 + 9x + 2736 = 0$

Answer: B

30. If $x^2 + \alpha_1 x + \beta_1 = 0$ and $x^2 + \alpha_2 x + \beta_2 = 0$ have a common root (x - k), then find k.

A.
$$k=rac{lpha_2-lpha_1}{eta_2-eta_1}$$

B. $k=rac{lpha_2-lpha_1}{eta_2-eta_1}$
C. $k=rac{lpha_2-lpha_1}{eta_2-eta_1}$
D. $k=rac{lpha_2-lpha_1}{eta_2-eta_1}$

Answer: A



1. If one of the roots of $x^2+(1+k)x+2k=0$ is twice the other, then $\displaystyle rac{a^2+b^2}{ab}=$

A. 2

- B. 1
- C. 4
- D. 7



2. If lpha and eta are the roots of $2x^2-x-2=0$, then $\left(lpha^3+eta^{-3}+2lpha^{-1}eta^{-1}
ight)$ is equal to

A.
$$-\frac{17}{8}$$

B. $\frac{23}{6}$
C. $\frac{37}{9}$
D. $-\frac{29}{8}$



3. In a right angled triangle one of the perpendicular sides is 4 cm greater than the other and 4 cm lesser than the hypotensuse, Find the area of triangle in cm^2 .

A. 72

B.48

C. 36

D. 96



4. In a friction, the denominator is 1 less than the numerator. The sum of the fraction and its reciprocal is $2' \frac{1}{56}$. Find the fraction.

A.
$$\frac{3}{2}$$

B. $\frac{13}{12}$
C. $\frac{18}{17}$
D. $\frac{8}{7}$

Answer: D

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5. The length of the rectangular surface of a table is 10m more than its breadth. If the area of the surface is $96m^2$, its perimeter is (in m) _____.

A. 64

B.44

C. 52

D. 48

Answer: B

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6. If α and β the roots of the equation $x^2 + 9x + 18 = 0$, then the quadratic equation having the roots $\alpha + \beta$ and $\alpha - \beta$ is _____. Where $(\alpha > \beta)$.

A.
$$x^2 + 6x - 27 = 0$$

B. $x^2 - 9x + 27 = 0$
C. $x^2 - 9x + 7 = 0$

D. $x^2 + 6x + 27 = 0$

Answer: A



7. Find the minimum value of the quadratic expression $4x^2 - 3x + 4$.

A.
$$\frac{-55}{16}$$

B. $\frac{55}{16}$
C. $\frac{16}{15}$
D. $\frac{161}{22}$

Answer: B



8. If (x+2) is a common factor of the expression $x^2 + ax - 6, x^2 + bx + 2$ and $kx^2 - ax - (a+b)$, then k = _____.

A. 2

B. 3

C. 1

D. -2

Answer: C

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9. The roots of a pure quadratic equation exists only

if _____.

A.
$$a>0, c<0$$

B. c > 0, a < 0

 $\mathsf{C}.\,a>0,c\leq 0$

D. Both (a) and (b)





Answer: A

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11. If x + 3 is the common factor of the expreassions



A. -2

B. 2

C. 3

D. -1



12. If the sum of the roots of an equation $x^2 + px + 1 = 0 (p > 0)$ is twice the difference between them, then p =____.

A.
$$-\frac{1}{4}$$

B. $\frac{3}{4}$
C. $\frac{4}{\sqrt{3}}$
D. $\frac{\sqrt{3}}{2}$

Answer: C



13. The equation $x+rac{5}{3-x}=3+rac{5}{3-x}$ has

A. no real root.

B. one real root.

C. two equal roots.

D. infinite roots.

Answer: A



14. The roots of the equation
$$\frac{1}{2x-3} - \frac{1}{2x+5} = 8$$
 are



Answer: B





A. 0 and -4

B. 0 and 6

C. 0 and 12

D. 6 and 12

Answer: C

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16. The minimum value of $2x^2 - 3x + 2$ is _____.

A.
$$\frac{7}{8}$$

B. $\frac{4}{7}$

C. 4

D. -3

Answer: A





A. $\sqrt{2}+1, \sqrt{2}-1$

 $\mathsf{B.}\,1,\sqrt{2}$

 $\mathsf{C}.\,1+\sqrt{2},\,1-\sqrt{2}$

D.2, 1
Answer: C



18. if
$$2x^2 + 4x - k = 0$$
 is same as $(x-5)\left(x+\frac{k}{10}\right) = 0$, then find the value of k.
A. 100
B. 90
C. 70

D. 35

Answer: C





1. Two persons A and B solved a quadratic equation of the form $x^2 + bx + c = 0$. A made a mistake in noting down the coefficient of x and obtained the roots as 18 and 2, where as B obtained the roots as -9 and -3 by misreading the constrant term. The correct roots of the equation are

- A. -6, -3
- B. 6, 6
- C.-6, -5
- D. 6, 6

Answer: D



2. If α and β are positive the the least value of $(\alpha^{-6} + \beta^{-6} + 2\alpha^{-3}\beta^{-3})\alpha^6\beta^6$ where α =2 and β =3.

A. 16

B.25

C. 30

D. 36

Answer: B



3. If $b_1, b_2, b_3, \dots, b_n$ are positive then the least value of $\begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$

$$(b_1+b_2+b_3+\ldots+b_n)igg(rac{1}{b_1}+rac{1}{b_2}+\ldots+rac{1}{b_n}igg)$$
is

A.
$$b_1b_2...b_n$$

B. n^2+1

 $\mathsf{C.}\,n(n+1)$

 $\mathsf{D.}\,n^2$

Answer: D



A. no solution.

B. one solution.

C. two solutions.

D. more than two solutions.



5. Out of the group of employees, twice the square root of the number of the employees, twice the square root of the number of the employes are on a trip to attend a conference held by the company , half the number are in the the office and the remaining six employees are on leave. What is the number of employees in the group ?

A. 49

B. 64

C. 36

D. 100

Answer: C



6. Find the quadratic equation whose roots are 2 times the roots of $x^2 - 12x - 13 = 0$.

A.
$$x^2 - 24x - 52 = 0$$

B.
$$x^2 - 24x - 26 = 0$$

$$\mathsf{C}.\,x^2 - 14x - 15 = 0$$

D. None of these





7. If one of the roots of $ax^2 + bx + c = 0$ is thrice

that of the other root, then b can be

A.
$$\frac{4ac}{3}$$

B.
$$\frac{16ac}{9}$$

C.
$$4\sqrt{\frac{ac}{3}}$$

D.
$$\sqrt{\frac{4ac}{3}}$$

Answer: C



8. If lpha,eta are the roots of $px^2+qx+r=0$, then

$$\alpha^3 + \beta^3 =$$

A.
$$rac{3qpr-q^3}{p^3}$$

B. $rac{3pqr-3q}{p^3}$
C. $rac{pqr-3q}{p^3}$
D. $rac{3pqr-q}{p^3}$



9. If lpha and eta are the roots of $x^2-(a+1)x+rac{1}{2}ig(a^2+a+1ig)=0$ then $lpha^2+eta^2=$ ____.

A. A and B

 $\mathsf{B}. a^2$

C. 2a

D. 1

Answer: A

10. The number of roots of the equation $2|x|^2-7|x|+6=0$

A. 4

B. 3

C. 2

D. 1



11. In a quadratic equation $ax^2 - bx + c = 0, a, b, c$ are distinct primes and the product of the sum of the roots and product of the root is $\frac{91}{9}$. Find the difference between the sum of the roots and the product of the roots.

A. 2

B. 3

C. 4

D. Cannot be determined



12. Maximum value of $rac{2+12x-3x^2}{2x^2-8x+9}$ is _____.

A. 14

B. 17

C. 11

D. Cannot be determined



13. If $x^2 + ax + b$ and $x^2 + bx + c$ have a common factor (x - k), then k = _____.

A.
$$\frac{a-b}{b-c}$$
B.
$$\frac{b-c}{c-a}$$
C.
$$\frac{c-b}{b-a}$$
D.
$$\frac{c-b}{a-b}$$

Answer: D



14. If
$$9x-3y+z=0$$
 , then the value of $rac{y}{2x}+\sqrt{rac{x^2-4xz}{4x^2}}$

(where x,y,z and constants).

A. 9

B. 2

C. 3

D. 6

Answer: C



15. If the roots of $3x^2 - 12x + k = 0$ are complex,

then find the range of k.

A. k < 22

B. a < -10

 ${\sf C}.\,k>11$

 ${\sf D}.\,k>12$

Answer: D



16. If lpha, eta are the roots of $ax^2 + bx + c = 0$, then find the quadratic equation whose roots are

 $\alpha + \beta, \alpha \beta.$

A.
$$ax^2 + (ab - ac)x - c = 0$$

B. $ax^2 + (b - c)x - bc = 0$
C. $a^2x^2 + (b - c)x - ac = 0$
D. $a^2x^2 + (ab - ac)x - bc = 0$

Answer: D

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17. Ramu swims a distance of 3 km each upstream and downstream. The total time taken is one hour. If

the speed of the stream is 4 km/h, then find the

speed of Ramu in still water.

A. 12 km/h

B. 9km/h

C. 8 km/h

D. 6 km/h

Answer: C



18. In solving a quadratic equation $x^2 + px + q = 0$

a student made a mistake in copying the coefficient

of x and obtined the root as 4, -3 but one of the actual roots is 2 what is the difference between the actual and wrong values of the coefficients of x ?

A. 5

B. 4

C. 7

D. 46



19. The roots of $ax^2 - bx + 2x = 0$ are in the ratio

of 2:3, then _____.

A.
$$a^2 = bc$$

- $\mathsf{B.}\, 3b^2 = 25ac$
- $\mathsf{C.}\,2b^2=75c$

D.
$$5b^2=ac$$

Answer: B



20. If the roots of $9x^2 - 2x + 7 = 0$ are 2 more than the roots of $ax^2 + bx + c = 0$, then 4a - 2b + c can be

A. -2

B. 7

C. 9

D. 10

Answer: B

21. If roots of $ax^2 + bx + c = 0$ are 2 , more than the roots of $px^2 + qx + r = 0$, then the value of c in terms of p,q and r is

A.
$$p + q + r$$

B.
$$4p - 2q + r$$

$$\mathsf{C.}\, 3p-q+2r$$

$$\mathsf{D}.\,2p+q-r$$

Answer: B

22.	If	the	roots	of	$2x^2+7x+5=0$ are t	he
reci	pro	cal	roots	of	$ax^2+bx+c=0$, th	en
a-c =						
	A. 3					
	B3	3				
	C2	2				
I	D5	5				

Answer: A

23. If the roots of the equation $ax^2 + bx + c = 0$ is $\frac{1}{k}$ times the roots of $px^2 + qx + r = 0$, then which of the following is true ?

A.
$$a=pk$$

B. $\displaystyle rac{a}{b}=\displaystyle rac{p}{q}$
C. $aq=pbk$

D.
$$ab=pqk^2$$

Answer: C