Directions 1 – 2 : Answer the questions based on the information given below.

Equation(i): $ax^2 + bx + c = 0$

Equation(ii): $py^2 + qy + d = 0$

The value of q is the smallest natural number while the value of a is the smallest prime number. The value of c is equal to 45 more than the twice of a hundred. The value of b is one more than ten times the value of a. The value of p is equal to the value of q. The value of d is 132.

Find the negative root of equation(i) is what percent of the negative root of equation(ii).

1. 145.83%
2. 150.35%
3. 144.44%
5. 140.00%

Q:2 Find the sum of the square of positive roots.

1. 150
2. 155
3. 170
5. 140

Directions 3 – 4 : Answer the questions based on the information given below.

In a class of 30 students, the average score in a mathematics test was 75. The teacher mistakenly recorded one student's score as 65 instead of 95.

Equation(1): $x^2 + 23x + c = 0$

Equation(2): $y^2 + 21y + c/2 = 0$

The value of c is equal to the correct average score of the students.

Q:3 Find the sum of the square of the roots of both equations except common roots.

1. 30
2. 25
3. 15
5. 10

Q:4 Which root is common in both equations?

1. −12
2. −19
3. −17
5. −21

Q:5 Answer the questions based on the information given below.

In a cricket tournament, a batsman scores the following runs in six innings: 40, 20, 15, 25, 55, and 25.

Equation(i): $x^2 - x - c = 0$

Equation(ii): $2y^2 - 7y - c = 0$

The value of c is equal to the average runs scored by the batsman per inning

Find the sum of all the roots of both equations.

1. 9/5
2. 4/3
3. 9/2
5. 3/2

Answer Key

1. (1)	2. (3)	3. (4)	4. (2)	5. (3)

Answers and Solutions

Q:1 The correct answer is **Option 1** i.e. **145.83%.**

The value of q is the smallest natural number = q = 1

The value of a is the smallest prime number = a = 2

The value of c is equal to 45 more than twice a hundred = c = 2 × 100 + 45 = 200 + 45 = 245

The value of b is one more than ten times the value of a

b = 10 × 2 + 1 = 20 + 1 = 21

The value of p is equal to the value of q

p = 1

The value of d = 132

Putting values in the equation

Equation(i): $2x^2 + 21x - 245 = 0$

Equation(ii): $1y^2 + 1y - 132 = 0$

Solving Equation(i)

$2x^2 + 21x - 245 = 0$

$2x^2 - 14x + 35x - 245 = 0$

$2x(x - 7) + 35(x - 7) = 0$

$(2x + 35)(x - 7) = 0$

$x = -35/2, 7$

Solving Equation(ii)

$1y^2 + 1y - 132 = 0$

$y^2 + 12y - 11y - 132 = 0$

$y(y + 12) - 11(y + 12) = 0$

$(y - 11)(y + 12) = 0$

$y = 11, -12$

Now, according to the question

Negative root of equation(i) is what percent of the negative root of equation(ii) = $-35/2 / -12 × 100$ = $35/2/12 × 100$ = $35/24 × 100$ = 145.83%

Q:2 The correct answer is **Option 3** i.e. **170.**

The value of q is the smallest natural number = q = 1

The value of a is the smallest prime number = a = 2

The value of c is equal to 45 more than twice a hundred = c = 2 × 100 + 45 = 200 + 45 = 245

The value of b is one more than ten times the value of a

b = 10 × 2 + 1 = 20 + 1 = 21

The value of p is equal to the value of q

p = 1

The value of d = 132

Putting values in the equation

Equation(i): $2x^2 + 21x - 245 = 0$

Equation(ii): $1y^2 + 1y - 132 = 0$

Solving Equation(i)

$2x^2 + 21x - 245 = 0$

$2x^2 - 14x + 35x - 245 = 0$

$2x(x - 7) + 35(x - 7) = 0$

$(2x + 35)(x - 7) = 0$

$x = -35/2, 7$

Solving Equation(ii)

$1y^2 + 1y - 132 = 0$

$y^2 + 12y - 11y - 132 = 0$

$y(y + 12) - 11(y + 12) = 0$

$(y - 11)(y + 12) = 0$

$y = 11, -12$

Now, according to the question

The sum of the square of positive roots = $(7)^2 + (11)^2$ = 49 + 121 = 170

Q:3 The correct answer is **Option 4** i.e. **20.**

Correct total score = (Average score) × (Number of students) + Difference

Correct total score = 75 × 30 + 30

Correct total score = 2250 + 30 = 2280

Correct average score = 2280/30 = 76 = c

On putting the values of c in the equations

Equation(1): $x^2 + 23x + 76 = 0$

Equation(2): $y^2 + 21y + 38 = 0$

Now solving the equation,

Equation(1): $x^2 + 23x + 76 = 0$

$x^2 + 19x + 4x + 76 = 0$

$x(x + 19) + 4(x + 19) = 0$

$(x + 4)(x + 19) = 0$

$x = -4, -19$

Equation(2): $y^2 + 21y + 38 = 0$

$y^2 + 19y + 2y + 38 = 0$

$y(y + 19) + 2(y + 19) = 0$

$(y + 2)(y + 19) = 0$

$y = -2, -19$

Now, according to the question,

Sum of the Square of the roots except common roots = $(-4)^2 + (-2)^2$ = 16 + 4 = 20

Q:4 The correct answer is **Option 2** i.e. **–19**.
Correct total score = (Average score) × (Number of students) + Difference
Correct total score = 75 × 30 + 30
Correct total score = 2250 + 30 = 2280
Correct average score = 2280/30 = 76 = c
On putting the values of c in the equations
Equation(1): $x^2 + 23x + 76 = 0$
Equation(2): $y^2 + 21y + 38 = 0$
Now solving the equation,
Equation(1): $x^2 + 23x + 76 = 0$
$x^2 + 19x + 4x + 76 = 0$
$x(x + 19) + 4(x + 19) = 0$
$(x + 4)(x + 19) = 0$
$x = -4, -19$
Equation(2): $y^2 + 21y + 38 = 0$
$y^2 + 19y + 2y + 38 = 0$
$y(y + 19) + 2(y + 19) = 0$
$(y + 2)(y + 19) = 0$
$y = -2, -19$
Now, according to the question,
The root which is common in both the equations = –19

Q:5 The correct answer is **Option 3** i.e. **9/2**.
Average runs scored by the batsman per inning = $(40 + 20 + 15 + 25 + 55 + 25)/6 = 180/6 = 30$
So, c = 30
On putting c = 30 in both equations
Equation(i): $x^2 - x - 30 = 0$
Equation(ii): $2y^2 - 7y - 30 = 0$
Solving both the equations
Equation(i): $x^2 - x - 30 = 0$
$x^2 - 6x + 5x - 30 = 0$
$x(x - 6) + 5(x - 6) = 0$
$(x + 5)(x - 6) = 0$
$x = -5, 6$
Equation(ii): $2y^2 - 7y - 30 = 0$
$2y^2 - 12y + 5y - 30 = 0$
$2y(y - 6) + 5(y - 6) = 0$
$(2y + 5)(y - 6) = 0$
$y = -5/2, 6$
Now, according to the question
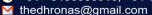Sum of all the roots = $(-5) + 6 + (-5/2) + 6$
$\Rightarrow -5 - 5/2 + 12$
$\Rightarrow (-10 - 5)/2 + 12$
$\Rightarrow -15/2 + 12$
$\Rightarrow (-15 + 24)/2 = 9/2$

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