

1. Simplify  $(5 - i) - (4 - i)^2 \div (4 - i)$

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2. Let  $z = (1 + i)^{10}$

Identify  $\text{Im}(z)$ .

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3. Find  $x + y$  if  $x$  and  $y$  are real numbers such that  $(2 - i)x + (1 + 3i)y = 7$ .

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4. What is the minimum value of  $y = 13\sin x + 84\cos x$ ?

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5. The rational expression  $\frac{8x - 9}{2x^2 + x - 15}$  can be written as  $\frac{A}{x + 3} + \frac{B}{2x - 5}$ . Find  $A + B$

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6. State the range of the function  $y = 3 + 2\cos x$

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7. What are the coordinates of the point where  $y = |x - 3| - 2$  is not differentiable?

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8. The sequence  $\left\langle \frac{2n + 3}{n + 4} \right\rangle$  converges to  $k$  while the sequence  $\langle 3^{-n} \rangle$  converges to  $p$ .

Find the value of  $k + p$ .

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9. What is the **length** of the vector  $6i - 13j + 18k$ ?

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10. Evaluate  $\int_0^3 (3x^2 + 4x - 1) dx$

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11. At a party, every attendee shakes hands with every other attendee once. If 231 handshakes occur at the party, how many people attended?

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12. How many ways can six students stand in a straight line if two students refuse to stand next to one another?

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13. A cube of volume  $1000 \text{ cm}^3$  is painted and is then cut into cubes with volume  $1 \text{ cm}^3$ .  
Calculate the number of cubes with 2 painted faces.

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14. What is the size of the acute angle between the hour and minute hands of a clock at 9:42?

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15. Given that it is 4 o'clock, exactly how long, in minutes, will it take for the minute hand to catch up with the hour hand?

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16. How many milliliters of distilled water should be mixed with 20 milliliters of 60% acid to obtain a mixture that is 30% acid?

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17. Simplify:  $\frac{x^2 - y^2}{xy} - \frac{xy - y^2}{xy - x^2}$

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18. The expense of a bus trip for a group of students was \$144. If an additional 6 students were taken, each student would pay \$1.20 less. How many students were there in the original group?

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19. 3 employees can make 15 burgers in 10 minutes. How many employees would be needed to make 300 burgers in half an hour?

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20. In a Mathematics Competition each correctly answered question gains 7 marks while 3 marks are deducted for each incorrect answer.

Dinesh answered 20 questions and received a total of 60 marks. How many questions did he get wrong?

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