<table>
<tr><td></td><td>ANSWER KEY</td></tr>
<tr><td>1</td><td>Limit does not exist</td></tr>
<tr><td>2</td><td>We have, $\lim_{x\to a}\frac{\sqrt{a+2x}-\sqrt{3x}}{\sqrt{3a+x}-2\sqrt{x}}$
$=\lim_{x\to a}\frac{\sqrt{a+2x}-\sqrt{3x}}{\sqrt{3a+x}-2\sqrt{x}}\times\frac{\sqrt{a+2x}+\sqrt{3x}}{\sqrt{a+2x}+\sqrt{3x}}$
[multiplying numerator and denominator by $\sqrt{a+2x}+\sqrt{3x}$]
$=\lim_{x\to a}\frac{a+2x-3x}{(\sqrt{3a+x}-2\sqrt{x})(\sqrt{a+2x}+\sqrt{3x})}$
[∵ (a - b) (a + b) = $a^2 - b^2$]
$=\lim_{x\to a}\frac{(a-x)(\sqrt{3a+x}+2\sqrt{x})}{(\sqrt{a+2x}+\sqrt{3x})(\sqrt{3a+x}-2\sqrt{x})\sqrt{3a+x}+2\sqrt{x})}$
[multiplying numerator and denominator by $\sqrt{3a+x}+2\sqrt{x}$]
$=\lim_{x\to a}\frac{(a-x)[\sqrt{3a+x}+2\sqrt{x}]}{(\sqrt{a+2x}+\sqrt{3x})(3a+x-4x)}$
$=\lim_{x\to a}\frac{(a-x)(\sqrt{3a+x}+2\sqrt{x})}{(\sqrt{a+2x}+\sqrt{3x})(3a-3x)}=\frac{\sqrt{3a+a}+2\sqrt{a}}{3(\sqrt{a+2a}+\sqrt{3a})}$
$=\frac{4\sqrt{a}}{3\times2\sqrt{3a}}=\frac{2}{3\sqrt{3}}=\frac{2\sqrt{3}}{9}$</td></tr>
<tr><td>3</td><td>Given, $\lim_{x\to4}\frac{\lvert x-4\rvert}{x-4}$
LHL = $\lim_{x\to4^-}\frac{-(x-4)}{x-4}=-1$ [∵ $\lvert x - 4\rvert = -(x - 4)$ if x < 4]
RHL = $\lim_{x\to4^+}\frac{x-4}{x-4}=1$ [∵ $\lvert x - 4\rvert = (x - 4)$ if x > 4]
Since LHL ≠ RHL
Therefore, limit doesn't exist.</td></tr>
<tr><td>4</td><td>We have to find $\lim_{x\to0}\frac{(x+2)^{1/3}-2^{1/3}}{x}$
Put x + 2 = y ⇒ x = y - 2
$=\lim_{y-2\to0}\frac{y^{1/3}-2^{1/3}}{y-2}=\lim_{y\to2}\frac{y^{1/3}-2^{1/3}}{y-2}$
$=\frac{1}{3}\cdot(2)^{\frac{1}{3}-1}=\frac{1}{3}\cdot2^{-2/3}\quad\left[\text{using }\lim_{x\to a}\frac{x^n-a^n}{x-a}=n\cdot a^{n-1}\right]$
Hence, given limit = $\frac{1}{3}(2)^{-2/3}$</td></tr>
<tr><td>5</td><td></td></tr>
<tr><td>6</td><td>P(A ∪ B) = 0.45, P(B ∩ C) = 0.15, P(exactly one of the three occurs) = 0.13 + 0.10 + 0.28 = 0.51</td></tr>
<tr><td>7</td><td>the required probability is 4/9</td></tr>
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9	Answer: Given: No. of reds balls = 8 No. of white balls = 5 Thus, total no. of balls, n = 13 Now, 3 balls are drawn at random, thus, r = 3 Thus, n (S) = ^nC_r = $^{13}C_3$ CBSELabs.com 1. If all balls are white, P (A) = n (A)/ n(S) = no. of favorable outcomes/ sample space Now, total white balls are = 5 Thus, P (all the three balls are white) = $^5C_3$ / $^{13}C_3$
10	**Sol.** Let E_1, E_2, E_3, E_4 and E_5 be the event that surgeries are rated as very complex, complex, routine, simple or very simple, respectively. $\therefore \quad P(E_1) = 0.15, P(E_2) = 0.20, P(E_3) = 0.31, P(E_4) = 0.26, P(E_5) = 0.08$ (a) $P(\text{complex or very complex}) = P(E_1 \text{ or } E_2) = P(E_1 \cup E_2)$ $= P(E_1) + P(E_2) - P(E_1 \cap E_2) = 0.15 + 0.20 - 0 = 0.35$ (b) $P(\text{neither very complex nor very simple})$, CBSELabs.com $P(E'_1 \cap E'_5) = P(E_1 \cup E_5)' = 1 - P(E_1 \cup E_5)$ $= 1 - [P(E_1) + P(E_5)] = 1 - (0.15 + 0.08) = 1 - 0.23 = 0.77$ (c) $P(\text{routine or complex}) = P(E_3 \cup E_2) = P(E_3) + P(E_2) = 0.31 + 0.20 = 0.51$ (d) $P(\text{routine or simple}) = P(E_3 \cup E_4) = P(E_3) + (E_4) = 0.31 + 0.26 = 0.57$