Sample: Statistics and Probability - Multiple Choice Questions

Q1
\[
\frac{\$3.26}{2 \text{ L}} = \frac{\text{cost of } 1 \text{ liter}}{1 \text{ L}} = \text{unit rate}
\]
Answer B

Q2
\[
\frac{\$4.37}{454 \text{ g}} = \frac{\text{price per } 100 \text{ g}}{100 \text{ g}} \Rightarrow \text{price per } 100 \text{ g} = \frac{\$4.37}{454 \text{ g}} \times 100 \text{ g} \approx \$0.96
\]
Answer A

Q3
\[
x = \frac{28.7 \text{ L}}{346 \text{ km}} \approx 0.0829 \frac{\text{L}}{\text{km}} = 8.29 \frac{\text{L}}{100 \text{ km}}
\]
Answer A

Q4
\[
v = \frac{S}{t} = \frac{15 \text{ km}}{1.25 \text{ h}} = 12 \frac{\text{km}}{\text{h}}
\]
Answer A

Q5
\[
r = \frac{600 \text{ L}}{7.5 \text{ h}} = \frac{600 \text{ L}}{7.5 \text{ h} \times 3600 \frac{s}{h}} \approx 0.022 \frac{\text{L}}{s}
\]
Answer C

Q6
When the scooter is traveling at 0 km/h the distance does not change. So, the interval with horizontal line segment is to be selected (DE)
Answer D

Q7
When the scooter is traveling at 9 km/h the distance increases by 9 units (km) when the time increases by 60 units (min). Proportionally, we get changes by 3 units in distance corresponding to 20-unit change in time. The interval BC satisfies this condition.
Answer C

Q8
When the scooter is traveling the fastest, slope of the line is largest by its absolute value (difference between distance values should be maximal when time is changed by 1 cell (5 minutes)). The interval EF satisfies this condition.
Answer C

Q9
The new image will be larger than the original if scale factor is more than 1.
0.86 < 1; 116\% = 1.16 > 1; 9/5 = 1.8 > 1.
So, answers II and III are correct
Answer C
Q10
The scale factor is ratio of the new size to the original size:

\[ r = \frac{3m}{46 \text{ cm}} = \frac{300 \text{ cm}}{46 \text{ cm}} \approx 6.5 \]

Using the second dimension:

\[ r = \frac{2m}{32 \text{ cm}} = \frac{200 \text{ cm}}{32 \text{ cm}} \approx 6.25 \]

So, the nearest scale among the provided ones is 1:6
Answer D

Q11
\[ a = \frac{a'}{r} = \frac{8.4 \text{ cm}}{0.024} = 350 \text{ cm} = 3.5 \text{ m} \]
\[ b = \frac{b'}{r} = \frac{9.12 \text{ cm}}{0.024} = 380 \text{ cm} = 3.8 \text{ m} \]

Answer A

Q12
\[ a = \frac{a'}{r} = \frac{5.4 \text{ cm}}{\frac{1 \text{ cm}}{300 \text{ km}}} = 1620 \text{ km} \]

Answer B

Q13
In the cone given:
\[ \frac{h}{d} = \frac{15\text{ cm}}{9\text{ cm}} = \frac{5}{3} \]

For the cones given in answers:
A: \[ \frac{h}{d} = \frac{30\text{ cm}}{18\text{ cm}} = \frac{5}{3} \]
B: \[ \frac{h}{d} = \frac{10\text{ cm}}{5\text{ cm}} = 2 \neq \frac{5}{3} \]
B: \[ \frac{b}{d} = \frac{20\text{ cm}}{11\text{ cm}} = \frac{20}{11} \neq \frac{5}{3} \]
Answer A

Q14
\[ a = \frac{a'}{r} = \frac{17\text{ cm}}{\frac{1}{35}} = 595 \text{ cm} = 5.95 \text{ m} \]
\[ b = \frac{b'}{r} = \frac{18 \text{ cm}}{\frac{1}{35}} = 630 \text{ cm} = 6.3 \text{ m} \]
\[ c = \frac{c'}{r} = \frac{19.7 \text{ cm}}{\frac{1}{35}} = 689.5 \text{ cm} = 6.895 \text{ m} \]

Answer C
Q15
\[
\frac{S}{S_0} = \left(\frac{h}{h_0}\right)^2 = \left(\frac{700}{35}\right)^2 = 400
\]
Answer B

Q16
\[
\frac{v_2}{v_1} = \frac{h_2 * \pi * r_2^2}{h_1 * \pi * r_1^2} = \left(\frac{h_2}{h_1}\right) * \left(\frac{r_2}{r_1}\right)^2 = \left(\frac{120}{30}\right) * \left(\frac{20}{5}\right)^2 = 64
\]
Answer A

Q17
The heavier “tails” of the distribution – the largest standard deviation.
Answer A

Q18
\[
\mu = \frac{1 * 30 + 2 * 50 + 3 * 20 + 4 * 10 + 5 * 40}{30 + 50 + 20 + 10 + 40} \approx 2.87
\]
\[
\sigma = \sqrt{\frac{(1 - 2.87)^2 + (2 - 2.87)^2 + (3 - 2.87)^2 + (4 - 2.87)^2 + (5 - 2.87)^2}{5 - 1}} \approx 1.59
\]
Answer B

Q19
\[
\mu = \frac{70 * 10 + 20 * 25 + 8 * 50 + 2 * 100}{100} = 18
\]
Answer A

Q20
\[
\sigma = \sqrt{\frac{70 * (10 - 18)^2 + 25 * (25 - 18)^2 + 8 * (50 - 18)^2 + 2 * (100 - 18)^2}{100}} \approx 16.54
\]
Answer C

Q21
\[
P(5 \leq x \leq 10) = P(x(5) \leq z \leq x(10)) = P\left(\frac{5 - 6}{3} \leq z \leq \frac{10 - 6}{3}\right) = P\left(-\frac{1}{3} \leq z \leq \frac{4}{3}\right)
\]
\[
\approx P(0 \leq z \leq 0.33) + P(0 \leq z \leq 1.33) = 0.1293 + 0.4082 = 0.5375
\]
Answer B

Q22
\[
P(x \leq b) = P(z \leq z(b)) = 0.75 = 0.5 + P(0 \leq z \leq z(b)) \Rightarrow P(0 \leq z \leq z(b)) = 0.25 =
\]
\[
> z(b) \approx 0.67 = \frac{b - 6}{3} \Rightarrow b = 6 + 3 \times 0.67 = 8.01
\]
Answer C

Q23
\[
\mu = \frac{60 * 7 + 70 * 3 + 80 * 8 + 90 * x}{7 + 3 + 8 + x} > 75
\]
\[
\frac{1270 + 90 \cdot x}{18 + x} > 75 \\
1270 + 90x > 1350 + 75x \\
15x > 80 \\
x > 5.3333
\]

Answer B

Q24

\[p(-z \leq Z \leq z) = 2 \cdot p(0 \leq Z \leq z) = 0.453 \implies p(0 \leq Z \leq z) = 0.2265 \implies z \approx 0.6\]

Answer C

Q25

\[p(H < h) = p(Z < z(h)) = 0.95 = 0.5 + p(0 \leq Z \leq z(h)) \implies p(0 \leq Z \leq z(h)) = 0.45 = z(h) \approx 1.645 = \frac{h - 70}{2.4} \implies h \approx 73.9\]

Answer D

Q26

\[p(x > 112.3) = p(z > z(112.3)) = p\left(z > \frac{112.3 - 104.3}{5.7}\right) \approx p(z > 1.4) = 0.5 - p(0 \leq z \leq 1.4) = 0.5 - 0.4192 = 0.0808\]

Answer A

Q27

\[p(a < z < 0) = p(0 < z < -a) = 0.3925 \implies -a = 1.24 \implies a = -1.24\]

Answer B

Q28

\[p(x = 10) = p_N(9.5 < x < 10.5) = p\left(\frac{9.5 - 8.3}{1.8} < z < \frac{10.5 - 8.3}{1.8}\right) = p(0.67 < z < 1.22) = p(0 \leq z \leq 1.22) - p(0 \leq z \leq 0.67) = 0.3888 - 0.2486 = 0.1402\]

Answer C

Q29

\[p(Z > z(s)) = 0.25 = 0.5 - p(0 \leq Z \leq z(s)) \implies P(0 \leq Z \leq z(s)) = 0.25 \implies z(s) \approx 0.67 = \frac{s - 62}{8.7} \implies x \approx 67.6\]

Answer B

Q30

\[p(-a < x < a) = 0.8 = 2 \cdot p(0 \leq x < a) = 2 \cdot p(0 \leq z < z(a)) \implies p(0 \leq z < z(a)) = 0.4 \implies z(a) \approx 1.28 = \frac{a - 125}{5} \implies a \approx 131.4\]

Answer B