Sample: Statistics and Probability - Multiple Choice Questions

Q1

$$\frac{\$3.26}{2\ L} = \frac{cost\ of\ 1\ liter}{1L} = unit\ rate$$

Answer B

Q2

$$\frac{\$4.37}{454\ g} = \frac{price\ per\ 100\ g}{100\ g} => price\ per\ 100\ g = \frac{\$4.37}{454g} * 100g \approx \$0.96$$

Answer A

Q3

$$x = \frac{28.7L}{346\ km} \approx 0.0829\frac{L}{km} = 8.29\frac{L}{100\ km}$$

Answer A

Q4

$$v = \frac{S}{t} = \frac{15km}{1.25\ h} = 12\frac{km}{h}$$

Answer A

Q5

$$r = \frac{600L}{7.5h} = \frac{600L}{7.5h * 3600\frac{s}{h}} \approx 0.022\frac{L}{s}$$

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:

$$r = \frac{3m}{46\ cm} = \frac{300\ cm}{46\ cm} \approx 6.5$$

Using the second dimension:

$$r = \frac{2m}{32cm} = \frac{200\ cm}{32\ cm} \approx 6.25$$

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

Answer D

Q11

$$a = \frac{a'}{r} = \frac{8.4\ cm}{0.024} = 350\ cm = 3.5\ m$$

$$b = \frac{b'}{r} = \frac{9.12\ cm}{0.024} = 380\ cm = 3.8\ m$$

Answer A

Q12

$$a = \frac{a'}{r} = \frac{5.4\ cm}{\frac{1}{300}\frac{cm}{km}} = 1620\ km$$

Answer B

Q13

In the cone given:

$$\frac{h}{d} = \frac{15cm}{9cm} = \frac{5}{3}$$

For the cones given in answers:

A: $\frac{h}{d} = \frac{30cm}{18cm} = \frac{5}{3}$

B: $\frac{h}{d} = \frac{10cm}{5cm} = 2 \neq \frac{5}{3}$

B: $\frac{h}{d} = \frac{20cm}{11cm} = \frac{20}{11} \neq \frac{5}{3}$

Answer A

Q14

$$a = \frac{a'}{r} = \frac{17cm}{1/35} = 595\ cm = 5.95\ m$$

$$b = \frac{b'}{r} = \frac{18\ cm}{1/35} = 630\ cm = 6.3\ m$$

$$c = \frac{c'}{r} = \frac{19.7\ cm}{1/35} = 689.5\ cm = 6.895\ m$$

Answer C

Q15

$$\frac{S}{S0} = \left(\frac{h}{h0}\right)^2 = \left(\frac{700}{35}\right)^2 = 400$$

Answer B

Q16

$$\frac{v2}{v1} = \frac{h2 * \pi * r2^2}{h1 * \pi * r1^2} = \left(\frac{h2}{h1}\right) * \left(\frac{r2}{r1}\right)^2 = \left(\frac{120}{30}\right) * \left(\frac{20}{5}\right)^2 = 64$$

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

$$\sigma = \sqrt{\frac{70}{100}(10 - 18)^2 + \frac{25}{100}(25 - 18)^2 + \frac{8}{100}(50 - 18)^2 + \frac{2}{100}(100 - 18)^2} \approx 16.54$$

Answer C

Q21

$$P(5 \le x \le 10) = P(z(5) \le z \le z(10)) = P\left(\frac{5 - 6}{3} \le z \le \frac{10 - 6}{3}\right) = P\left(-\frac{1}{3} \le z \le \frac{4}{3}\right)$$
$$\approx P(0 \le z \le 0.33) + P(0 \le z \le 1.33) \approx 0.1293 + 0.4082 = 0.5375$$

Answer B

Q22

$$P(x \le b) = P(z \le z(b)) = 0.75 = 0.5 + P\big(0 \le z \le z(b)\big) => P\big(0 \le z \le z(b)\big) = 0.25 =$$
$$> z(b) \approx 0.67 = \frac{b - 6}{3} => b = 6 + 3 * 0.67 = 8.01$$

Answer C

Q23

$$\mu = \frac{60 * 7 + 70 * 3 + 80 * 8 + 90 * x}{7 + 3 + 8 + x} > 75$$

$$\frac{1270 + 90 * x}{18 + x} > 75$$
$$1270 + 90x > 1350 + 75x$$
$$15x > 80$$
$$x > 5.3333$$

Answer B

Q24

$$p(-z \le Z \le z) = 2 * p(0 \le Z \le z) = 0.453 => p(0 \le Z \le z) = 0.2265 => z \approx 0.6$$

Answer C

Q25

$$p(H < h) = p\big(Z < z(h)\big) = 0.95 = 0.5 + p\big(0 \le Z \le z(h)\big) => p\big(0 \le Z \le z(h)\big) = 0.45 =$$
$$> z(h) \approx 1.645 = \frac{h - 70}{2.4} => h \approx 73.9$$

Answer D

Q26

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

Answer A

Q27

$$p(a < z < 0) = p(0 < z < -a) = 0.3925 => -a = 1.24 => a = -1.24$$

Answer B

Q28

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

Answer C

Q29

$$p(Z > z(s)) = 0.25 = 0.5 - P\big(0 \le Z \le z(s)\big) => P\big(0 \le Z \le z(s)\big) = 0.25 => z(s) \approx 0.67$$
$$= \frac{s - 62}{8.7} => x \approx 67.6$$

Answer B

Q30

$$p(-a < x < a) = 0.8 = 2 * p(0 \le x < a) = 2 * p\big(0 \le z < z(a)\big) => p\big(0 \le z < z(a)\big)$$
$$= 0.4 => z(a) \approx 1.28 = \frac{a - 125}{5} => a \approx 131.4$$

Answer B