

LC 2018: PAPER 2**QUESTION 9 (40 MARKS)****Question 9 (a)**(i) Sphere: $r = 0.3$ cm

$$V = \frac{4}{3} \pi r^3 = \frac{4}{3} \pi (0.3)^3 = 0.113 \text{ cm}^3$$

MARKING SCHEME NOTES**Question 9 (a) (i) [Scale 10B (0, 5, 10)]**

5: • Volume formula with radius substituted

10: • Correct answer without work

Note 1: • Answer: 0.113097 (without work) Merits F^* Note 2: $\pi = 3.14$, Volume = 0.11304; $\pi = \frac{22}{7}$, $V = 0.1131428571$ (ii) Number of grams of gold = 0.113×19.3 g = 2.18 g**MARKING SCHEME NOTES****Question 9 (a) (ii) [Scale 5B (0, 2, 5)]**

2: • Any work of merit e.g. Indicates multiplication by 19.3

5: • Correct answer without work

(iii) $197 \text{ g} \rightarrow 6.02 \times 10^{23}$ atoms

$$1 \text{ g} \rightarrow \frac{6.02 \times 10^{23}}{197} \text{ atoms}$$

$$2.18 \text{ g} \rightarrow \frac{6.02 \times 10^{23} \times 2.18}{197} \text{ atoms} = 6.7 \times 10^{21} \text{ atoms}$$

MARKING SCHEME NOTES**Question 9 (a) (iii) [Scale 5C (0, 2, 3, 5)]**2: • Finds expression for atoms in 1 g
• Two incorrect operations and finishes3: • Finds expression for atoms in 2.18 g
• One incorrect operation and finishes

Question 9 (b)

(i) $n = 1560$

$$\begin{aligned} \text{Margin of error} &= \frac{1}{\sqrt{n}} = \frac{1}{\sqrt{1560}} \\ &= 0.025 = 2.5\% \end{aligned}$$

(ii) $\hat{p} = \frac{546}{1560} = 0.35$

$$\text{Confidence interval: } \hat{p} - \frac{1}{\sqrt{n}} \leftrightarrow \hat{p} + \frac{1}{\sqrt{n}}$$

$$0.35 - 0.025 \leftrightarrow 0.35 + 0.025$$

$$0.325 \leftrightarrow 0.375$$

$$32.5\% \leftrightarrow 37.5\%$$

(iii) Null hypothesis H_0 : 40% of viewers liked the show

$$p = 0.4 \text{ (population proportion)}$$

Alternative hypothesis H_1 : $p \neq 0.4$

p is not in the confidence interval.

Therefore, do not accept the null hypothesis.

MARKING SCHEME NOTES

Question 9 (b) (i) [Scale 5C (0, 2, 3, 5)]

2: • Writes $\frac{1}{\sqrt{n}}$

• Sets up work as $\sqrt{1560}$

3: • Correct formula fully substituted

i.e. $\left(\frac{1}{\sqrt{1560}}\right)$

• MOE formula substituted and calculated as 0.025318 without work

5: • Correct answer without work

Question 9 (b) (ii) [Scale 5C (0, 2, 3, 5)]

2: • Work of merit e.g. writes answer from (b) (i) in this part

• Answer as $\frac{546}{1560}$

• $\hat{p} \pm \frac{1}{\sqrt{n}}$ or $\hat{p} \pm 1.96 \times \frac{1}{\sqrt{n}}$

3: • One boundary formed i.e. $(35 + 2.5 \text{ or } 35 - 2.5)$

• Correct answer without work

Question 9 (b) (iii) [Scale 10C (0, 3, 7, 10)]

3: • **Any** of: H_0 , H_1 , or C.I. correct

7: • **All** of: H_0 , H_1 , and C.I. correct

10: • Result of Hypothesis Test plus conclusion in context e.g. Reject the Null Hypothesis and hence reject the executive's claim