

Math SL PROBLEM SET 22

Section A (Short Answer)

1. **(A1.3 - N) (CA)** Use the nCr command on your calculator to evaluate the following: *(Cirrito 14.2, p498, Cirrito 4.1.1, p95)*

- a. $\binom{6}{0}$ and $\binom{6}{1}$ and $\binom{6}{2}$ and $\binom{6}{3}$ and $\binom{6}{4}$ and $\binom{6}{5}$ and $\binom{6}{6}$.
- b. Hence or otherwise, expand $(2x^2 - 5)^6$.
- c. State the value of the coefficient of the term containing x^8 .

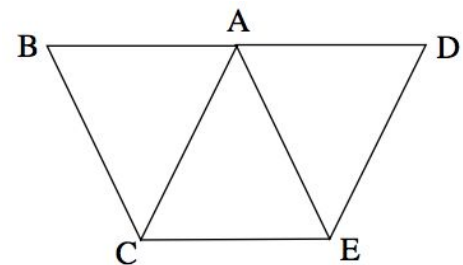
2. **(SP5.4 - E) (CA)** Here is a data set: *(Oxford 8.5, p171; Cirrito 13.5, p482)*

x	11	12	13	14	15	16	17
y	21	43	31	34	29	55	33

- a. Draw a scatter plot on graph paper.
- b. Find the median point and hence, draw the line of best fit such that your line goes through this median point.
- c. Determine the equation of the line of best fit from your GDC and find the value of the correlation coefficient.
3. **(A1.2 - N) (CA)** For the following logarithmic expressions, evaluate them and make connections: *(Cirrito 7.4, p221)*
- a. Evaluate $\log_3 25$ and $2 \times \log_3 5$. Compare your answers.
- b. Evaluate $\log_5 16$ and $4 \times \log_5 2$. Compare your answers.
- c. Evaluate $\ln 32$ and $5 \times \ln 2$. Compare your answers.
- d. Make a general statement about simplifying $\log_b (x^K)$

4. **(T3.6 - R) (CA)** The diagram two identical triangles ABC and ADE. You know that $AC = DE = 27.4$ m and that $BC = AE = 23.91$ m and that the angles ACB and AED are 58° . Find: *(Cirrito 9.5.1, p290, Cirrito 9.5.4, p300)*

- a. the distance BD and b. the angle DEB



5. **(T3.5 - E) (CI)** Solve the following trigonometric equations on the domain of $0 \leq x \leq 2\pi$: *(Cirrito 10.4, p351)*

- a. $4\sin^2(x) = 1$ b. $\cos(x - \frac{\pi}{6}) = -\frac{1}{2}$

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6. **(T3.3 - N) (CI)** Use your knowledge of special right triangles to work out the following relationships: *(Cirrito 10.1.2, p316; Cirrito 10.2.1, p327; Cirrito 10.2.2, p332)*
- Evaluate $\sin\left(\frac{2\pi}{3}\right)$ and $\cos\left(\frac{2\pi}{3}\right)$ and multiply the values. Evaluate $\frac{1}{2}\sin\left(\frac{4\pi}{3}\right)$. Compare.
 - Evaluate $\sin\left(\frac{3\pi}{4}\right)$ and $\cos\left(\frac{3\pi}{4}\right)$ and multiply the values. Evaluate $\frac{1}{2}\sin\left(\frac{6\pi}{4}\right)$. Compare.
 - Evaluate $\sin\left(\frac{5\pi}{6}\right)$ and $\cos\left(\frac{5\pi}{6}\right)$ and multiply the values. Evaluate $\frac{1}{2}\sin\left(\frac{10\pi}{6}\right)$. Compare.
 - Make a statement about a general relationship that may be emerging from these questions. (Compare the angles and compare the ratios/outputs)
 - Use your statement in part (d) to answer the following question \Rightarrow if $\sin(A) = \frac{3}{4}$, what would $\sin(2A)$ equal?

Section B (Extended Response/Investigation)

7. **(SP5.2 - R,N) (CA)** Here are the percentages of Mr. S's last IM3 quiz. *(Oxford 8.6, p276)*

87%, 93%, 78%, 99%, 95%, 71%, 87%, 85%, 91%, 83%

- Determine the mean and standard deviation of the class quiz results.
 - List the grades that lie more than 1 standard deviation from the mean score. List those which lie more than 2 standard deviations from the mean.
 - (CI)** Mr. S decides to subtract 10% to everyone's score. Find the new mean and standard deviation.
 - (CA)** Mr. S decides to half everyone's grade. PREDICT the new mean and standard deviation, then test it on the calculator.
 - Mr. D. has 15 students in his class and his class average was 95%. What would be the average of the quiz for the combined two classes?
8. **(SP5.4 - N) (CA)** An experiment is performed, wherein a metal bar is heated and its length is measured in order to determine the correlation between the heat applied to the metal and its length. *(Oxford 10.3, p345; Oxford 10.4, p349)*

Heat (°C)	40	45	50	55	60	65	70	75	80
Length (mm)	20	20.12	20.20	20.21	20.25	20.25	20.34	20.47	20.61

- Draw a scatter plot on your calculator.
- Determine the equation of the line of best fit from your GDC.
- Comment on the strength of the relationship, using both the r and r^2 values.
- To show that you understand what the values of r or r^2 communicate, go online and find scatter-plots showing you how to understand of the role of the r and r^2 values:
 - $r = 0.5$
 - $r = -0.75$
 - $r = -0.25$