

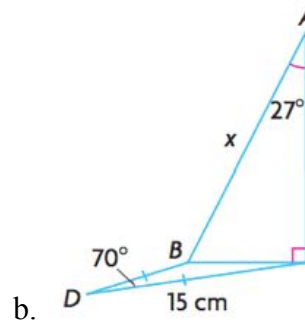
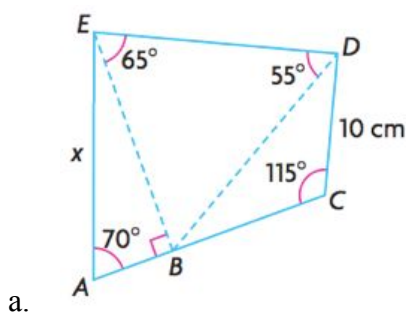
Math SL PROBLEM SET 42

Section A (Short Answer)

1. **(SP5.1, SP5.2 - R) (CA)** A random sample of 167 people who own mobile phones were surveyed to collect data on the amount of time they spent per day using their cell phones. The results are displayed on the table below: **(Oxford 8.6, p276)**

Minutes per day	$0 \leq t < 15$	$15 \leq t < 30$	$30 \leq t < 45$	$45 \leq t < 60$	$60 \leq t < 75$	$75 \leq t < 90$
Number of people	21	32	35	41	27	11

- a. Is the data discrete or continuous? Explain.
b. Show a calculation in order to determine an estimate for the mean time spent per day.
c. Use your GDC to find the mean and standard deviation and variance of the data.
d. Find the probability that someone spends at least 60 minutes using their phone given that they spend at most 75 minutes using their phone.
2. **(T3.6 - R) (CA)** In these two problems, solve for the indicated side and round your final answer correct to the nearest tenths. **(Cirrito 9.5.4, p300)**



3. **(SP5.8 - R) (CA)** The random variable X is binomially distributed with 7 trials and a probability of success of 0.375 on each trial. Determine: **(Cirrito 16.3.4, p544)**
- $P(X = 4)$
 - $P(X > 2)$
 - $P(X = 4 \mid X > 2)$
 - The expected value and variance of X .
4. **(A1.1 - R) (CI)** In an arithmetic sequence, $u_4 = 12$ and $u_{11} = -9$. Find the sum of the first 11 terms of the sequence. **(Cirrito 8.1, p241)**

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5. **(F2.6, F2.2 - R) (CI)** A function is defined as $g(x) = e^x - 1$. **(Cirrito 5.3.3, p136; 5.3.4, p141)**
- Find the intercept(s) and asymptote(s) of g .
 - Hence, sketch the function.
 - Mr. S. suggests that $f(x) = \ln(x) + 1$ is the inverse of g . Simplify the composition $g \circ f(x)$ to see if Mr. S is/isn't correct.
6. **(CA6.3 - N) (CI)** The derivative of a function is given as $\frac{d}{dx} f(x) = x^3 - x^2 - 6x$,
- Factor the derivative $\frac{d}{dx} f(x) = x^3 - x^2 - 6x$
 - Hence, determine where the original function, $f(x)$, has its extrema.
 - Hence, determine the domain intervals in which the original function is (i) increasing, (ii) decreasing.
 - Hence, sketch the function from the information you have determined from the derivative.
 - Find the equation of $f(x)$, knowing that $f(0) = 2$.

Section B (Extended Response/Investigation)

7. **(V4.3, T3.6 - N,R) (CA)** The triangle ABC has vertices at A(-1,2,3) and B(-1,3,5) and C(0,-1,1). **(Cirrito 12.6.1, p432)**
- Find the measure of the angle at vertex A.
 - Hence, or otherwise, find the area of the triangle.

Let L_1 be the line parallel to vector AB which passes through D(2,-1,0) and let L_2 be the line parallel to vector AC which passes through E(-1,1,1)

- Find the equations of L_1 and L_2
 - Hence, show that L_1 and L_2 do NOT intersect
8. **(F2.2, F2.4, F2.5, C6.1) (CI)** Let $f(x) = 1 - \frac{3}{x}$ and let $g(x) = x^2 - 3x$.
- Find, if possible, the coordinates of the minimum point(s) of f and g OR explain why it is not possible.
 - Find, if possible, the equation(s) of asymptote(s) to the functions of f and g OR explain why it is not possible.
 - Find the coordinates of the point(s) of intersection of the graphs of f and g .
 - Find the equation of the inverse function of each function.
 - Find the equation of the line tangent to $g(x)$ at the point where $x = 1$.