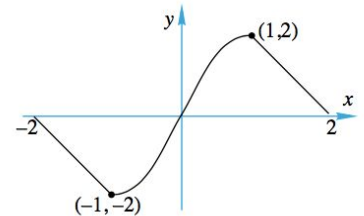


Math SL PROBLEM SET 18

Section A (Short Answer)

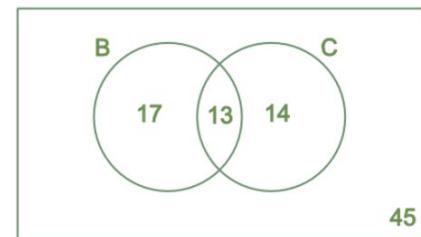
1. **(A1.1 - E) (CA)** For the following geometric sequences, determine (i) the common ratio, (ii) the 8th term and (iii) the sum of the first 8 terms: **(Cirrito, 8.2, p252)**
- a. 16, 8, 4, b. -4, 12, -36, 108, c. 25, 10, 4,

2. **(F2.2, F2.3 - E) (CI)** The graph of $y = f(x)$ is given. Use this graph to sketch the new graphs of the following. Label the intercepts and extrema (maximums and minimums) in the new graphs: **(Cirrito 6.1, p167; Cirrito 6.2, p177; Cirrito 6.3, p183)**



- a. $y = 1 + f(-x)$
b. $y = 2 - f(\frac{1}{2}x)$
c. $y = f(1 - x)$
3. **(SP5.5 - R) (CI)** The Venn diagram shows students that are studying a Science subject. The Venn diagram shows those studying Biology (B) and Chemistry (C). **(Cirrito 15.2, p508)**

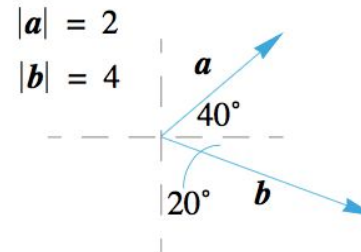
- a. Find $P(B)$ and $P(C)$.
b. What is the probability of a student studying Biology if they are also studying Chemistry?
c. What is the $P(B) \times P(C)$?
d. What is $P(B \text{ and } C)$ according to the information presented in the Venn Diagram?
e. Explain why your answers to Q(c) and Q(d) are different.



4. **(A1.2, F2.6 - R) (CA)** The population of a certain bacteria grows exponentially and can be modeled by $P(t) = 18(2)^{t/3.5}$ where t is time in hours. **(Cirrito 7.2, p209)**
- a. What was the population of the bacteria when the observations started?
b. What is the doubling period of this bacteria?
c. What is the hourly growth rate of this population?
d. How many bacteria will be present in 35 hours?
e. When will the bacteria reach a population of 294,900?
f. Let's now make the assumption that the bacteria population was changing continuously. Knowing the doubling period from Q(c), **show that** the equation can also be written using the natural base (e) as $P(t) = 18e^{0.198042 t}$.
5. **(T3.6 - R) (CA)** A triangle has adjacent sides measuring 12 cm and 10 cm and the angle between the sides is 2 radians. **(Cirrito 9.5.4, p300)**
- a. Draw a diagram, showing this triangle.
b. How many degrees is 2 radians?
c. Determine the measure of the third side of the triangle. Does it matter whether you used the angle measure of radians or degrees to answer this question?)

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6. **(V4.1, V4.2 - N) (CA)** You are given the information about two vectors, a and b , and the angle between these two vectors (see the diagram). You know the magnitude (length) of a is 2 and the magnitude of b is 4. *(Cirrito 12.4, p410; Cirrito 9.5.4, p300)*



- a. Draw the diagram in your notes. Draw a third vector that will connect the head of vector a to the head of vector b . Label this vector as c .
- b. Find the magnitude of vector c .
- c. Show that vector c is equal to vector b minus vector a . (i.e. $c = b - a$)

Section B (Extended Response/Investigation)

7. **(A1.2 - E) (CA)** Pattern Set: Use your TI-84 to determine the value of the following logarithms: *(Cirrito 7.4, p221)*

$\log_2 0$	$\log_2 1$	$\log_2 2$	$\log_2 3$	$\log_2 4$	$\log_2 5$	$\log_2 6$
$\log_2 7$	$\log_2 8$	$\log_2 9$	$\log_2 10$	$\log_2 11$	$\log_2 12$	$\log_2 13$
$\log_2 14$	$\log_2 15$	$\log_2 16$	$\log_2 17$	$\log_2 18$	$\log_2 19$	$\log_2 20$

Look for patterns amongst the numbers & outputs:

- i) Compare $\log_2 3$ and $\log_2 5$ and $\log_2 15$
 - ii) Compare $\log_2 3$ and $\log_2 4$ and $\log_2 12$
 - iii) Compare $\log_2 4$ and $\log_2 5$ and $\log_2 20$
 - iv) Can you see some patterns that will lead to some GENERALIZATIONS that would then in turn allow us to make PREDICTIONS?
 - i. So, predict the value of (i) $\log_2 48$, (ii) $\log_2 36$, (iii) $\log_2 75$
 - ii. So, predict the value of (i) $\log_2 \left(\frac{1}{3}\right)$, (ii) $\log_2 7.5$, (iii) $\log_2 \sqrt[3]{12}$
8. **(A1.2 - N) (CI)** If $\ln(2) = 0.69$ and $\ln(3) = 1.10$ and $\ln(5) = 1.61$, determine the values of: *(Cirrito 7.4, p221)*

- | | | | |
|----------------|----------------|----------------|----------------|
| (a) $\ln(100)$ | (b) $\ln(1.5)$ | (c) $\ln(150)$ | (d) $\ln(0.1)$ |
| (e) $\ln(135)$ | (f) $\ln(1.2)$ | | |