

# Math SL PROBLEM SET 19

## Section A (Short Answer)

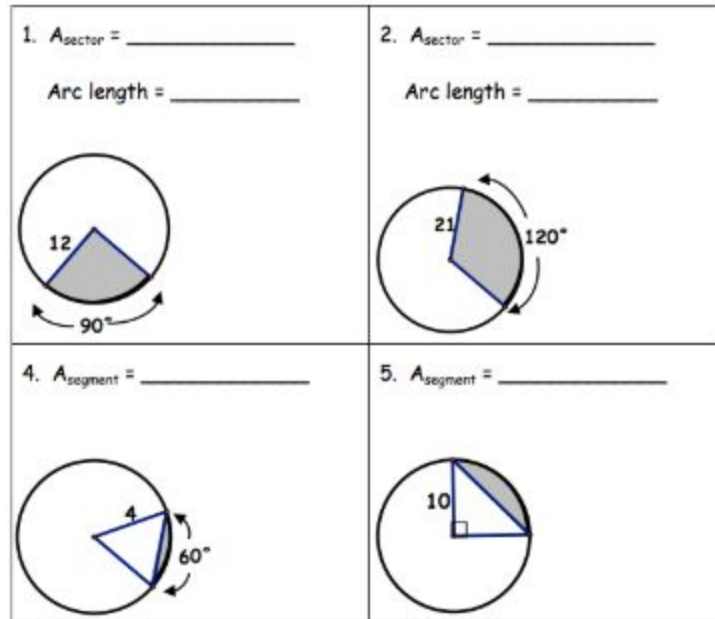
1. **(T3.5 - E) (CI)** For the following expressions, factor the expression in the first column and then the corresponding trigonometric expression in the second column. What observation do you make? **(Cirrito 2.4.1, p39)**

(a) $x^2 - 1$	(b) $\sin^2(x) - 1$
(c) $x^2 - x - 2$	(d) $\cos^2(x) - \cos(x) - 2$
(e) $x^2 - x$	(f) $\sin^2(x) - \sin(x)$
(g) $2x^2 - x - 1$	(h) $2\cos^2(x) - \cos(x) - 1$

2. **(SP5.2 - E) (CA)** Here are the results of Nadine's last 5 quiz scores: 75%, 83%, 67%, 83%, 76%. **(Cirrito 13.3, p474; Oxford 8.3, p260)**
- Find her mean quiz score and find the standard deviation of her quiz scores.
  - Nadine would like to raise her quiz average to 79%. What must be the score of her next quiz in order to get the average of 79%.
  - Mr. D wants to raise ALL grades by 6%. What will be the new (i) mean and (ii) standard deviation of her quiz scores?
3. **(SP5.5, SP5.6 - R) (CI)** For the two events,  $A$  and  $B$ , it is known that:  $P(A' \cap B') = 0.35$ ;  $P(A) = 0.25$ ;  $P(B) = 0.6$  (HINT: do NOT assume the events are independent ... why?). Find **(Cirrito 15.2, p508)**
- $P(A \cap B)$
    - $P(B | A)$
    - $P(B' | A)$
  - Can you draw a venn diagram for this problem? Draw one OR explain why you can't.
  - Can you draw a tree diagram for this problem? If so, draw one OR explain why you can't.
4. **(T3.2 - R) (CI)** Recall our special right triangles. Use them to determine **(Cirrito 10.1, p315)**
- $\sin(\pi/3)$
  - $\cos(-2\pi/3)$
  - $\tan(5\pi/4)$
  - $\sin^2(\pi/6) - \cos^2(\pi/4)$
  - $2\cos^2(\pi/3) - 1$
  - $\sin^{-1}(1/2)$
  - $\tan^{-1}(-1)$
5. **(A1.1 - E) (CI)** Given an arithmetic sequence wherein the first term is 5 and the fourth term is 17, determine: **(Cirrito, 8.1, p241)**
- The eighteenth term,
  - The sum of the first twelve terms
  - If the numbers 5 and 17 were the first two terms of a geometric sequence, what would be the next two terms of this geometric sequence?

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6. **(T3.1 - N) (CA)** Find the areas and arc lengths in the following diagrams. *(Cirrito 9.7, p309; Oxford 11.7, p391)*



## Section B (Extended Response/Investigation)

7. **(F2.2, F2.5, F2.6 - R) (CI)** For the following functions, determine: (i) the equation(s) of the asymptotes, (ii) the x- and y-intercept(s) and hence sketch the functions on graph paper, labelling these key features. State the transformations that were applied to the “parent” function as well.

*(Cirrito 5.3, p122)*

a.  $g(x) = 5 - \frac{1}{2}e^x$

b.  $h(x) = 2 + \ln(x - 5)$

8. **(T3.3 - N) (CA) Identities:** An algebraic identity is an algebraic equation that true for every value of  $x$ . For example, the equation  $(x + 2)^2 = x^2 + 4x + 4$  is going to be true, regardless of what number you substitute in for  $x$ . *(Cirrito 10.2, p327)*

- a. Substitute in  $x = 1, x = 2, x = 5$  into BOTH sides of the equation and see what happens.
- b. Is the algebraic equation  $x^2 + y^2 = (x + y)^2 - 2xy$  an identity? True or False? Prove it.
- c. We also have trig identities. Given the equation  $\sin^2(x) + \cos^2(x) = 1$ , use  $x = \frac{\pi}{6}$  and  $x = \frac{\pi}{4}$  to show that  $\sin^2(x) + \cos^2(x) = 1$  could be an identity. How would you prove it?
- d. Given the expression  $2\sin(x)\cos(x)$ :
  - i. Evaluate  $2\sin(x)\cos(x)$  for  $x = 30^\circ$ . Then, use your answer to evaluate  $\sin^{-1}(\text{ANS})$ .
  - ii. Evaluate  $2\sin(x)\cos(x)$  for  $x = 45^\circ$ . Then, use your answer to evaluate  $\sin^{-1}(\text{ANS})$ .
  - iii. What observation do you make?
  - iv. Graph the function  $f(x) = 2\sin(x)\cos(x)$  to confirm your observation in Qdiii