

Math SL PROBLEM SET 15

Section A (Short Answer)

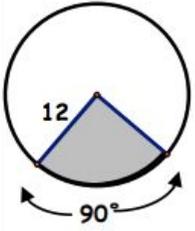
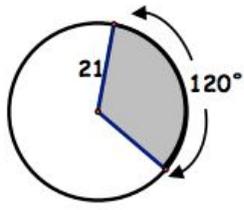
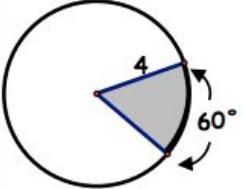
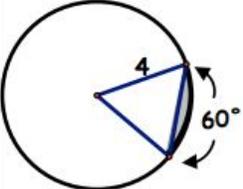
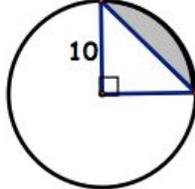
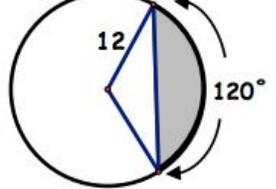
1. **(T3.5 - E) (CI)** For the following expressions, factor the expression in the first column and then the corresponding trigonometric expression in the second column. What observation do you make? *(Cirrito 2.4.1, p39)*

(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. **(T3.2 - R) (CI)** Recall our special right triangles. Use them to determine *(Cirrito 10.1, p315)*
- $\sin(\pi/3)$
 - $\cos(-2\pi/3)$
 - $\tan(5\pi/4)$
 - $\sin^2(\pi/6) + \cos^2(\pi/6)$
 - $2\cos^2(\pi/3) - 1$
 - $\sin^{-1}(1/2)$
 - $\tan^{-1}(-1)$

Math SL PROBLEM SET 15

4. **(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?
5. **(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)*
- 16, 8, 4,
 - 4, 12, -36, 108,
 - 25, 10, 4,
6. **(T3.1 - N) (CA)** Find the areas and arc lengths in the following diagrams. *(Cirrito 9.7, p309; Oxford 11.7, p391)*

<p>1. $A_{\text{sector}} =$ _____ Arc length = _____</p> 	<p>2. $A_{\text{sector}} =$ _____ Arc length = _____</p> 	<p>3. $A_{\text{sector}} =$ _____ Arc length = _____</p> 
<p>4. $A_{\text{segment}} =$ _____</p> 	<p>5. $A_{\text{segment}} =$ _____</p> 	<p>6. $A_{\text{segment}} =$ _____</p> 

Math SL PROBLEM SET 15

7. **(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)**
- $P(A \cap B)$
 - $P(A|B)$
 - $P(B|A')$
 - Can you draw a venn diagram for this problem? If so, 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.

Section B (Extended Response/Investigation)

8. **(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. **(Cirrito 5.3, p122)**

a. $f(x) = \frac{5 - 2x}{3x + 6}$

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

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

d. $k(x) = 3 - \frac{2}{x + 4}$

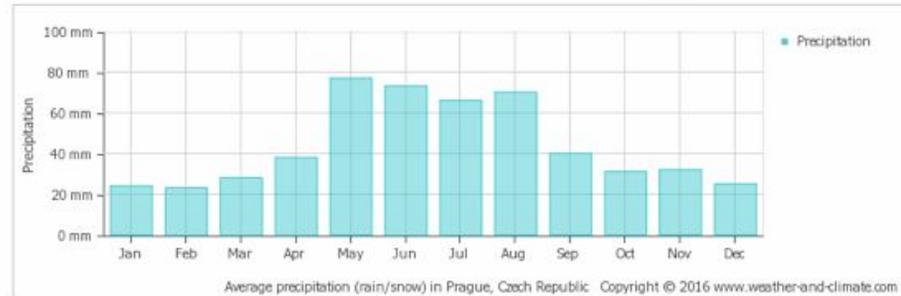
Math SL PROBLEM SET 15

9. **(T3.6 - R) (CA)** Mr. S and Mr. D are vacationing in the city of Prague (Czech Republic). The number of hours (and minutes) of daylight on the 15th of each month, beginning in January, is shown for Prague, as is the average monthly rainfall. (*Cirrito 10.5, p361*)

Month	Hours of Daylight
1	8:30
2	10:07
3	11:48
4	13:44
5	15:04
6	16:21
7	15:38
8	14:33
9	12:42
10	10:47
11	9:06
12	8:05

AVERAGE MONTHLY PRECIPITATION OVER THE YEAR (RAINFALL, SNOW)

This is the mean monthly precipitation, including rain, snow, hail etc. Show in [Inches](#) »



- Explain why Mr S changes the time of 8:30 hours into 8.5 hours.
- Use your curve of best fit and the data table to write a model for the number of hours of daylight as a function of the month (where $m = 1$ represents the month of January - so think about what 0.001 and 0.999 mean).
- Use your **model** to predict the number of hours of daylight on July 31st.
- Likewise, given the data for the amount of rainfall in Prague, write a sinusoidal equation that Mr. S can use to model the amount of rainfall in Prague.
- Use your model to predict how much rain we could expect in Prague in May (month 5). State the value for the rainfall from the chart for the month of May as comparison. What is the percent error in the predicted value compared to the actual value?