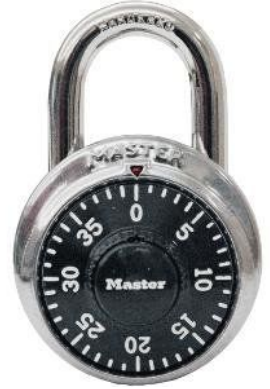


Math SL PROBLEM SET 7

Section A (Short Answer)

1. **(A1.3 - E) (CA)** Before I can open my gym locker, I must remember the combination. Two of the numbers of this three-term sequence are 17 and 24, but I have forgotten the third, and do not know which is which. There are 40 possibilities for the third number. At ten seconds per try, at most how long will it take me to test every possibility? The answer is not 40 minutes!

(Cirrito 14.1.1, p491)



2. **(F2.3 - E) (CI)** The x -intercepts of $y = f(x)$ are -1 , 3 , and 6 . *(Cirrito 6.1, p167; 6.2, p177)*
- Find the x -intercepts of
 - $y = f(2x)$
 - $y = 2f(x)$
 - $y = f(x + 2)$
 - $y = f(mx)$
 - Compare the appearance of each graph to the appearance of the graph $y = f(x)$.

3. **(A1.2, F2.6 - E) (CA)** A frozen turkey whose core temperature is 70 degrees is placed in an oven that has been preheated to 325 degrees. After one hour, the core temperature has risen to 100 degrees. The turkey will be ready to serve when its core temperature reaches 190 degrees. To the nearest minute, how much more time will this take, if the relationship between time and temperature was (i) linear, (ii) exponential? *(Cirrito 7.2, p209)*

4. **(T3.5 - E) (CA)** Use special right triangles and, if necessary, a calculator to find all solutions for t between 360 and 720, inclusive: (a) $\cos t = \sin t$ (b) $\tan t = -4.3315$ (c) $\sin t = -0.9397$
- (Cirrito 10.1.2, p316)*

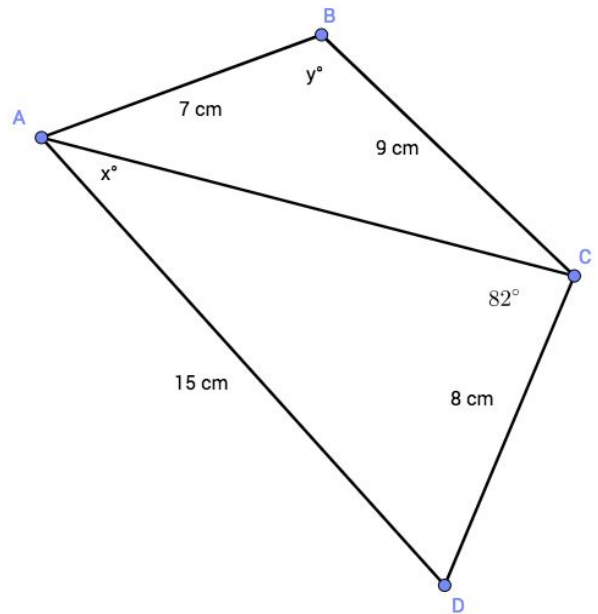
5. **(V4.2, T3.6 - N) (CA)** A javelin lands with six feet of its length sticking out of the ground, making a 52-degree angle with the ground. The sun is directly overhead. The javelin's shadow on the ground is an example of a perpendicular projection. Find its length, to the nearest inch.
- (Cirrito 9.1.1, p273)*

Math SL PROBLEM SET 7

6. **(T3.4, T3.5 - R) (CA)** Jamie rides a Ferris wheel for five minutes. The diameter of the wheel is 10 meters, and its center is 6 meters above the ground. Each revolution of the wheel takes 30 seconds. Being more than 9 meters above the ground enables Jamie to see the ocean. For how many seconds does Jamie see the ocean? *(Cirrito 10.5, p361)*
7. **(T3.3 - E) (CA)** Find simpler, equivalent expressions for the following. Justify your answers. *(Cirrito 10.1.2, p316)*
- (a) $\sin(180 + \theta)$ (b) $\cos(180 + \theta)$ (c) $\tan(180 + \theta)$.

Section B (Extended Response/Investigation)

8. **(T3.1, T3.6 - R) (CA)** The diagram shows quadrilateral ABCD, with $AB = 7$ cm, $BC = 9$ cm, $CD = 8$ cm and $AD = 15$ cm. Angle $ACD = 82^\circ$, angle $CAD = x^\circ$ and angle $ABC = y^\circ$. *(Cirrito 9.5.1, p290; Cirrito 9.5.4, p300)*



- a. Find the value of x . Express your answer in both degrees and radians.
- b. Find the length of AC
- c. Find the value of y . Express your answer in both degrees and radians.
- d. Find the area of the quadrilateral.
9. **(SP5.5 - R) (CI)** Max travels to school each day by bicycle, by bus or by car. The probability that he travels by bus on any day is 0.6 and the probability that he travels by bicycle on any day is 0.3. *(Oxford 3.5, p89)*
- a. Draw a tree diagram which shows the possible outcomes for Max's journeys on Monday and Tuesday. Label the tree diagram, writing the probabilities of each outcome.
- b. What is the probability that he travels
- i. By bicycle on Monday and Tuesday?

Math SL PROBLEM SET 7

- ii. By bicycle on Monday and bus on Tuesday?
 - iii. By the same method on Monday and Tuesday?
 - c. Max traveled to school by bicycle on Monday and Tuesday. What is the probability that he does not travel to school by bicycle on Wednesday, Thursday and Friday?
 - d. What is the probability that in any three days Max travels twice by car and once by bus or twice by bicycle and once by car?
10. **(F2.1, F2.2, F2.5, F2.7 - R) (CI)** Consider the functions $f(x)$ and $g(x)$ where $f(x) = 3x - 2$ and $g(x) = x - 3$. ***(Cirrito 5.4.1, p148; Cirrito 5.4.2, p157)***
- a. Find the inverse function, f^{-1} .
 - b. Given that $g^{-1}(x) = x + 3$, find $(g^{-1} \circ f)(x)$.
 - c. Show that $(f^{-1} \circ g)(x) = \frac{x-1}{3}$.
 - d. Solve $(f^{-1} \circ g)(x) = (g^{-1} \circ f)(x)$.

Let $h(x) = \frac{f(x)}{g(x)}$, $x \neq 2$,

- e. **Sketch** the graph of h for $-6 \leq x \leq 10$ and $-4 \leq y \leq 10$.
- f. Write down the **equations** of the asymptotes.