The CENTRE for EDUCATION in MATHEMATICS and COMPUTING

WATERLOO MATHEMATICS

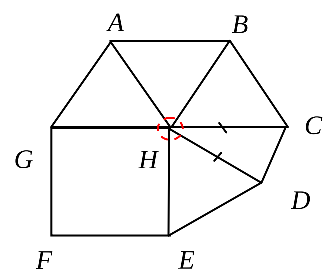
Grade 7

Extra Challenges - Set I

Answers:

1. Initially, Dean has 1000 Canadian dollars, which he can exchange for 7000 Hong Kong dollars $(7\times 1000 = 7000)$. At the end of his trip, he has 56 Canadian dollars, which he can exchange for 448 Hong Kong dollars $(56\times 8 = 448)$. That means that over the trip he spent $7000-448=6552$ Hong Kong dollars.

2. At the centre of the heptagon where all the vertices meet, the sum of the all the angles must be 360°, because the angles form a circle.
We know that $\angle GHE = 90^{\circ}$ because it's a vertex of a square, and since all the angles in an equilateral triangle are 60°, $\angle GHA = \angle AHB = \angle BHC = \angle DHE = 60^{\circ}$.
Thus, $\angle CHD = 360^{\circ} - 90^{\circ} - 4(60^{\circ}) = 30^{\circ}$. Since ΔCDH is isosceles, $\angle CDH = \angle HCD = \dfrac{180^{\circ}-30^{\circ}}{2} = 75^{\circ}$. Thus, $\angle HDC = 75^{\circ}$.



3. The population doubles every second, so half of the maximum population is achieved 1 second before the maximum population is achieved. Thus, the bacteria will reach half the maximum population at 59 seconds.

4. Creating a list of *a*, *b*, *c*, *d*, and *e*, where $a < b \le c \le d \le e$, we know *c* must be 25 because it's the median. If the mode is 28, at least 2 of the terms must be 28. Since there are only 2 numbers larger than 25, *d* and *e* must be 28. The mean is 22, so
$$\frac{a+b+25+28+28}{5} = 25$$
$$a+b+81=110$$
$$a+b=29$$
There is only one mode, so $b < c$ and *c* = 25, thus the largest *b* can be is 24, so the smallest *a* can be is 5. The smallest *b* can be is 15 which means that the largest *a* can be is 14. Thus, *a* can be any number between 5 and 14, inclusive.

5. A side of a triangle cannot be greater than the sum of the other two sides. Looking at ΔACD, *AC* must fall within the interval $2 < AC < 8$. In ΔABC, *AC* must fall within the interval $5 < AC < 13$. The intervals of numbers *AC* can be are numbers within both intervals, so $5 < AC < 8$.