

NOVEMBER  
2015

## DEPARTMENT OF MATHEMATICS

# PROBLEM SOLVING CHALLENGE

Q1.

*Junior Cycle*

What is the surface area of a cube of side 5 cm? Three such cubes are joined together side-by-side as shown. What is the surface area of the resulting cuboid?

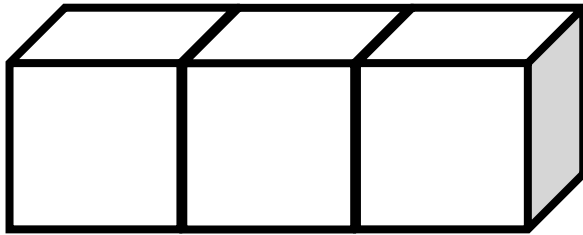


Diagram not to scale

Q2.

*Senior Cycle*

At a certain latitude the number ( $d$ ) of hours of daylight in each day is given by  $d = A + B \sin kt^\circ$ , where  $A$  and  $B$  are positive constants and  $t$  is the time in days after the spring equinox.

Assuming the number of hours of daylight follows an annual cycle of 365 days; find the value of  $k$  correct to three decimal places.

- If the shortest and longest days have 6 and 18 hours of daylight respectively state the values of  $A$  and  $B$ .
- Find in hours and minutes the amount of daylight on New Year's day which is 80 days before the spring equinox.
- A town at this latitude holds a fair twice a year on days that have exactly 10 hours of daylight. Find, in relation to the spring equinox, which two days these are.

Answers on an A4 sheet with your Name, Year and Class should be handed into the office or given to Mr. McEvoy before 4pm on Friday 27<sup>th</sup> of November

Monthly Prize for both **Junior** and **Senior** Cycle.\*

**Good Luck.**

*Junior Cycle students answer question 1 only.*

*Senior Cycle students answer question 2 only*