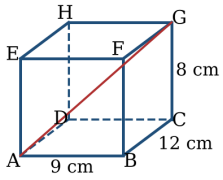
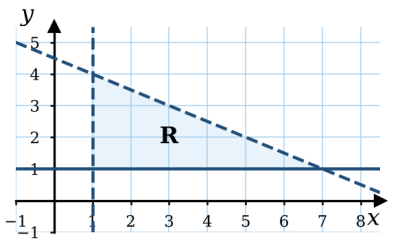
**Day 224** **IGCSE 10-a-day**

**1** The diagram shows a cuboid ABCDEFGH.
(Calculator)
(a) Work out the length of the diagonal AG.
(b) Work out the angle between AG and the base ABCD, to 1 decimal place.
The diagram is not drawn accurately.




**2** Region R is shaded. Solid boundaries are included, dashed ones are not.
(a) Write down the three inequalities that define R.
(b) How many points with integer coordinates lie in R?



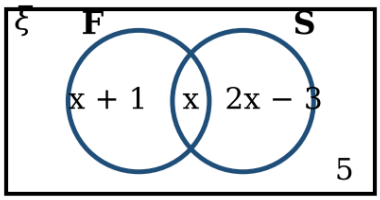

**3** Solve $12x^2 - 31x = -7$

**4** $y = 3x^3 + 18x^2 - 7x + 4$

(a) Find $\frac{d^2y}{dx^2}$.

(b) Find the value of x for which $\frac{d^2y}{dx^2} = 0$, and work out the gradient of the curve at this value of x.

**5** A circular arc has a chord AB of length 18 cm.
The greatest distance between the chord and the arc is 1 cm.
Work out the radius of the circle.

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|---|---|
| **6** $f(x) = x^{\frac{3}{2}} - 6x$ for $x > 0$<br>(a) Find the range of values of x for which f is a decreasing function.<br>(b) Find the least value of f(x). | |
| **7** Shape S has area 3 $cm^2$.<br>S is transformed by the matrix $\begin{pmatrix} k & 3 \\ 4 & 4 \end{pmatrix}$ and the image has area 12 $cm^2$.<br>Find the two possible values of k. | |
| **8** The area of a square is 99 $cm^2$, correct to the nearest $cm^2$.<br>Work out the lower bound of the side length of the square.<br>Give your answer correct to 3 significant figures. (Calculator) | |
| **9** The Venn diagram shows how many of 23 students study French (F) or Spanish (S).<br>(a) Work out the value of x.<br>(b) A student is chosen at random from those who study Spanish. Work out the probability that this student also studies French.<br> | |
| **10** A piece of wire 84 cm long is cut into two pieces. One piece is bent to form a square of side x cm. The other piece is bent to form a rectangle whose length is three times its width.<br>(a) Show that the total area, A $cm^2$, enclosed by the two shapes is $A = x^2 + \frac{3(84 - 4x)^2}{64}$.<br>(b) Find the value of x for which A is least, and work out this least area. | |