

Mathematics GCSE Higher Tier 2009
1380 Taster Pages

Question 22 (June 2009 – 1380/3H)

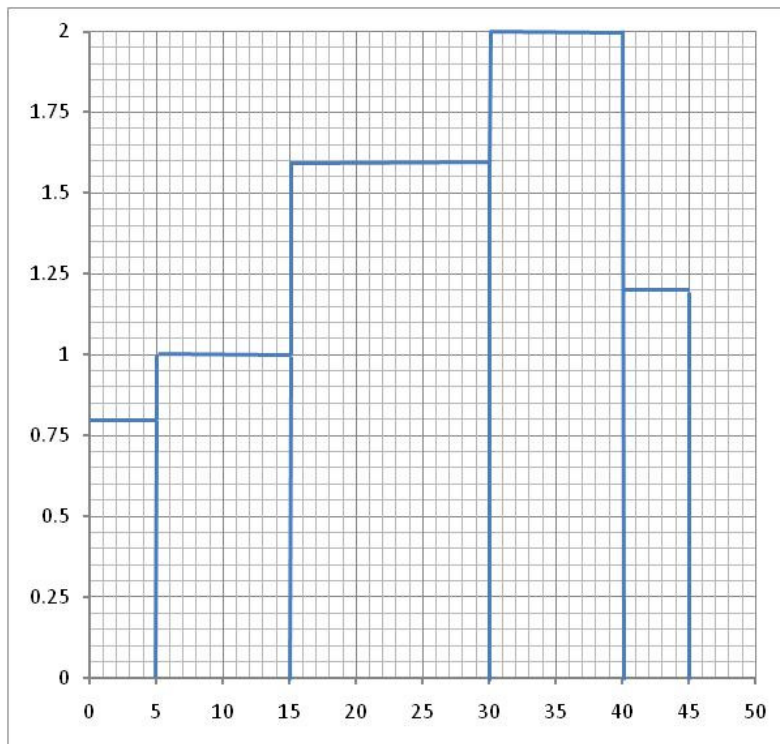
First we must calculate the frequency density for each class of data.

Frequency density = frequency \div class width

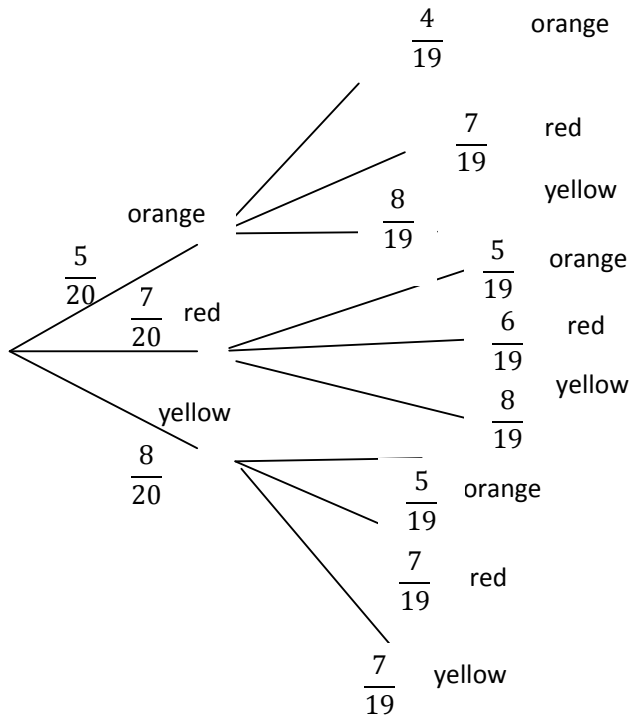
Insert two new columns

Length (x) minutes	frequency	Class width	Frequency Density
$0 < x \leq 5$	4	5	0.8
$5 < x \leq 15$	10	10	1
$15 < x \leq 30$	24	15	1.6
$30 < x \leq 40$	20	10	2
$40 < x \leq 45$	6	5	1.2

We can see that the highest frequency density is 2 so we can now decide on the scale (4cm to every 1 of frequency density) (we use most of the space given but also have a scale that is easy to plot)



Question 26 (June 2009 - 1380/4H)



The way we can have sweets not the same colour is
orange, red
orange, yellow
red, orange
red, yellow
yellow, orange
yellow, red

We add up the probabilities of the above

$$\left(\frac{5}{20} \times \frac{7}{19}\right) + \left(\frac{5}{20} \times \frac{8}{19}\right) + \left(\frac{7}{20} \times \frac{5}{19}\right) + \left(\frac{7}{20} \times \frac{8}{19}\right) + \left(\frac{8}{20} \times \frac{5}{19}\right) + \left(\frac{8}{20} \times \frac{7}{19}\right) =$$

$$\frac{35+40+35+56+40+56}{20 \times 19} = \frac{262}{380} = \frac{131}{190} = 0.689$$

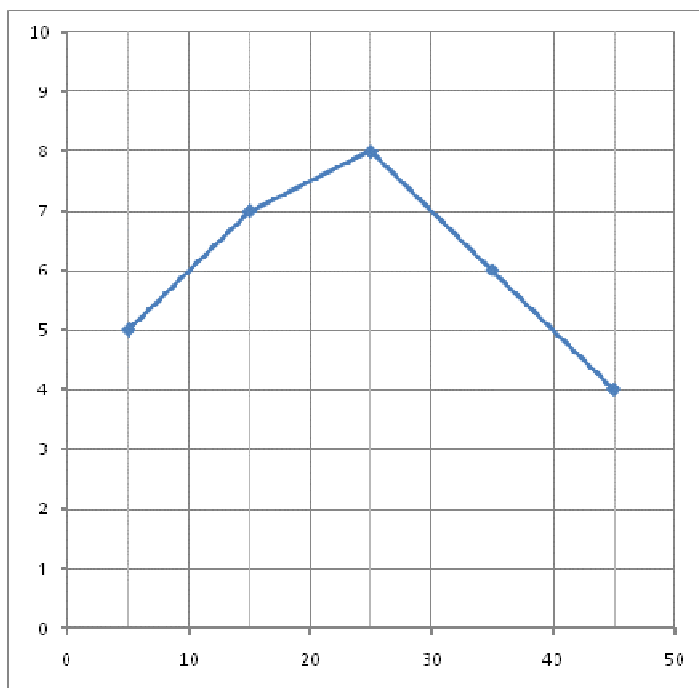


Mathematics GCSE Higher Tier 2009
1380 Taster Pages

Question 6 (November 2009 – 1380/3H)

a) first we need to calculate the mid point for each category. Then we plot mid point with frequency.

Time (t minutes)	Frequency	Mid point
$0 < t \leq 10$	5	5
$10 < t \leq 20$	7	15
$20 < t \leq 30$	8	25
$30 < t \leq 40$	6	35
$40 < t \leq 50$	4	45



b) the modal class interval is the class interval with the highest frequency. This is $20 < t \leq 30$



Question 20 (November 2009 – 1380/3H)

To solve simultaneous equations you can either solve by elimination or by substitution:

Elimination

We need the same number of x or the same number of y . We have $4x$ in both equations. If we subtract one equation from the other then the x terms will have been eliminated.

$$\begin{array}{r} (4x + y = -1) \\ - (4x - 3y = 7) \\ \hline y - -3y = -1 - 7 \end{array}$$

$$4y = -8$$

now divide both sides by 4

$$y = -2$$

substitute this value for y back into the first or the second equation. I am putting it back into the first equation.

$$4x + -2 = -1$$

$$4x - 2 = -1$$

add 2 to both sides of the equation

$$4x = 1$$

divide both sides of the equation by 4

$$x = \frac{1}{4}$$

we have $x = \frac{1}{4}$ and $y = -2$

substitute both of these back into the other equation to make sure it works (I need to put back into the second equation)

$$(4 \times \frac{1}{4}) - (3 \times -2) = 1 - -6 = 1 + 6 = 7 \checkmark$$

Substitution

First we need to rearrange one of the equations so that either x or y is the subject. The easiest one to rearrange here is the first equation.

$$4x + y = -1$$

subtract $4x$ from both sides

$$y = -1 - 4x$$

substitute this value for y into the second equation

$$4x - (3(-1 - 4x)) = 7$$

$$4x - (-3 - 12x) = 7$$

$$4x + 3 + 12x = 7$$

$$16x + 3 = 7$$

subtract 3 from both sides



Mathematics GCSE Higher Tier 2009
1380 Taster Pages

$$16x = 4$$

divide both sides by 16

$$x = \frac{4}{16} = \frac{1}{4}$$

going back to the rearranged equation $y = -1 - 4x$ and substituting in our value for x we get

$$y = -1 - (4 \times \frac{1}{4}) = -1 - 1 = -2$$

we have $x = \frac{1}{4}$ and $y = -2$

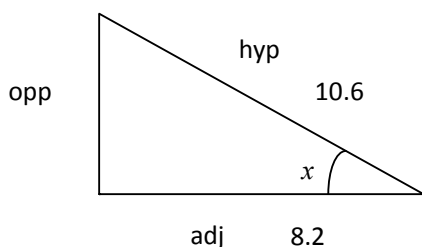
substitute both of these back into the other equation to make sure it works (I need to put back into the second equation)

$$(4 \times \frac{1}{4}) - (3 \times -2) = 1 - -6 = 1 + 6 = 7 \checkmark$$



Question 23 (November 2009 – 1380/4H)

As we have a right angled triangle we can use basic trigonometry. Start by labelling the sides from the point of view of the angle we have (or are trying to get)



If we write SOHCAHTOA. We are not using OPP so if we strike through O we get SØHCAHTØA we are left with CAH

$$\cos x = \frac{adj}{hyp} = \frac{8.2}{10.6} = 0.77358\dots$$

take inverse cos (\cos^{-1}) of both sides

$$x = \cos^{-1}(0.77358\dots) = 39.3^\circ \text{ (to 3 significant figures)}$$

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