Using Formulae www.m4ths.com

Task 1 – Substituting into Formulae

(1) Given than $p = 2$ and $q = 3$, find the value of each of the following:

(a) $\quad 2p + 3q$

(b) $\quad 4p - q$

(c) $\quad p^2 + 1$

(d) $\quad 1 - q^2$

(e) $\quad 2p - 3q$

(f) $\quad (p - 2q)^2$

(2) Given than $a = 5$ and $b = -2$, find the value of each of the following:

(a) $\quad a + b$

(b) $\quad a - b$

(c) $\quad 3a + 2b$

(d) $\quad 2a + b^2$

(e) $\quad (3a + 2b)^2$

Task 2 – Using Formulae

(1) Jane is using the formula:
$$A = 2B + 10$$
(a) Find the value of A when $B = 3$
(b) Find the value of A when $B = 6$
(c) Find the value of A when $B = -5$
(d) Find the value of B when $A = 16$
(e) Find the value of B when $A = -4$
(f) Find the smallest value of B such that $A > 47$

Task 3 – Writing Formulae

(1) Fred cleans windows. He charges a fixed call out fee of £8 and £3 for every window he cleans. He charges C pounds for cleaning W windows.

(a) Write a formula using C and W for the cost Fred charges his customers to clean their windows.
(b) Fred cleans 4 windows for Mrs Brown. How much will Mrs Brown have to pay Fred?
(c) Fred cleans 6 windows for Mr Smith. How much will Mr Smith have to pay Fred?
(d) A customer is given a bill of £47. How many windows did they have cleaned?
(e) Mr Singh is charged £52. Should he question his bill?
(f) Mr Wang calls Fred out but decides his windows don't need cleaning when Fred gets there. Should Mr Wang be charged? If so, how much would you expect him to have to pay?

(2) A bottle of medicine has the following instructions on it:
"The number of pills a patient should take is twice their age minus one"
(a) Write a formula using N for the number of pills and A for the age of the person taking the pills.
(b) How many pills would a 16 year old patient need?
(c) How many pills would a 23 year old patient need?
(d) Samir takes the correct dose for his age of 9 pills. How old is Samir?
(e) John takes 13 pills. How old should John be?
(f) Kate is a teenager. What is the maximum number of pills Kate could possibly take?
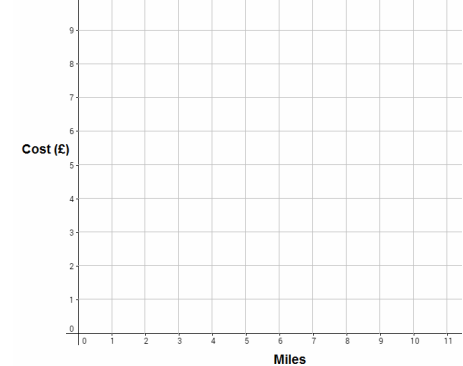
(3) Company A and Company B each offer a taxi service.
Company A charge a fixed call out fee of £2 and £1 for every mile travelled. Company B don't charge a fixed call out fee but charge £2 for every mile travelled.
(a) Write a formula for the cost (C) for travelling m miles for **both** Company A and Company B.
(b) Use the graph below to plot the cost of using each company.

(c) Company A charged Mrs Walton £6 for a journey. How far did she travel?
(d) Using your graph, state the distance for which both companies charge the same amount.
(e) Laura wants to hire a taxi. Advise her on which company to use. (Use the graph to help you inform her!)
(f) Using you graph, find the cost of a 55 mile journey with Company A explaining how you found your answer.
(g) Company C offer a flat rate of £8 for any journey up to 6 miles. Show this by adding a line to your graph.

Task 4 – Mixed Questions

(1) To convert a temperature from Fahrenheit to Celsius the following formula is used:
$$F = \frac{9}{5}C + 32$$
(a) Find the temperature in Fahrenheit when the temperature is $15^o C$
(b) Find the temperature in Fahrenheit when the temperature is $43^o C$ giving your answer to one decimal place.
(c) Find the temperature in Celsius when the temperature is $50^o F$.
(d) Find the temperature in Celsius when the temperature is $-12^o F$ giving your answer to one decimal place.
(e) The freezing point of water in Celsius is zero degrees. Find the freezing point of water in Fahrenheit.
(f) The boiling point of water in Fahrenheit is 212°. Use the formula to show that the boiling point of water in Celsius is one hundred degrees.

(2) Two electricity companies offer their best tariff to Mr Ron. Company X offer a monthly fixed cost of £21 & 10p per unit used. Company Y offer a fixed monthly cost of £13 & charge 20p a unit. Find the number of units Mr Ron could use before Company Y become less competitive than Company X.

(3) Without a calculator, find the value of p when $q = -0.5$ using the formula:
$$p = \left(2 - \frac{5}{q}\right)^2$$