Attempt questions 1, 4 (a), (c), (e), (g), (h), 9 (b), (c), (j), 11 (d), (f) before your tutorial class in week 3.

A. Fractions

1. Frank needs to get to a meeting scheduled for 11 am. He leaves home at 8 am. He takes a quarter of an hour to walk to the bus stop, where he waits half an hour for the bus to arrive. After a trip of one and three quarter hours he reaches his destination.

   (a) How long (in hours) was his total journey?
   (b) Does he reach his destination in time for the meeting?
   (c) Frank would like to have breakfast at a nearby cafe at his destination. Breakfast usually takes half an hour to order and eat. Will he have time for breakfast?

2. What is the sum of \( \frac{1}{2} - \frac{1}{3} + \frac{1}{4} - \frac{1}{5} + \frac{1}{6} \) and \( \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} \)?

3. If 2 \( \frac{1}{2} \) cakes are served in slices of \( \frac{1}{8} \) of a cake, how many slices are served?

4. Express the following fractions as decimals.
   (a) \( \frac{1}{2} \)
   (b) \( \frac{1}{4} \)
   (c) \( \frac{1}{5} \)
   (d) \( \frac{1}{8} \)
   (e) \( \frac{2}{5} \)
   (f) \( \frac{1}{3} \)
   (g) \( \frac{1}{10} \)
   (h) \( \frac{1}{100} \)
   (i) \( \frac{1}{50} \)
   (j) \( \frac{3}{5} \)
   (k) \( \frac{1}{25} \)
   (l) \( \frac{1}{1000} \)
   (m) \( \frac{1}{50} \)
   (n) \( \frac{1}{25} \)
   (o) \( \frac{125}{1000} \)

5. Lian earns $2,000 a fortnight and spends $1200 of that. What proportion of his salary does he save?

6. Nadia buys a packet of 60 samosas for a tea party. She takes out half for her family. She takes the remaining to the party. On the way she meets a friend who takes a sixth of the samosas. A little further on she sees a hungry cat and gives it a fifth of the samosas she has. The she suddenly feels hungry and eats a quarter of the remaining samosas. How many does she arrive with at the tea party?

7. I have a naan recipe that calls for 4 \( \frac{2}{3} \) cups of flour for 14 servings of naan. I want to make one serving only. How much flour should I use?

8. You currently have one third of a tank of fuel and you need half a tank to get home for the weekend. Your car holds 60 litres of petrol. The price of petrol today is 119.4 c and you have $14 only. Do you have enough money to get home for the weekend? Do you think you also have enough to buy a Snickers for $1.50?

B. Equations

9. Solve the following equations for the unknown.

   (a) \( x + 3 = 5 \)
   (b) \( 4y - 5 = y + 10 \)
   (c) \( \frac{2z}{z + 2} = 4 \)
   (d) \( 8x - 4 = 16 \)
   (e) \( x - \frac{1}{2} = 2 \)
   (f) \( 3 - 2x = 4 \)
   (g) \( 7x + 7 = 2(x + 1) \)
   (h) \( \frac{2y - 3}{4} = \frac{6y + 7}{3} \)
   (i) \( t = 2 - 2[2t - 3(1 - t)] \)
   (j) \( \frac{3}{2}(4a - 3) = 2[a - (4a - 3)] \)
   (k) \( \frac{x + 3}{x} = \frac{2}{5} \)
\[ p - 1 \quad \frac{2}{p - 2} \]
\[ \frac{x}{2} + \frac{x}{5} = 1 \]
\[ \frac{y - 4}{2} + \frac{y}{3} = 4 \]
\[ \frac{2}{y} + 4 = \frac{3}{y} \]
\[ \frac{2 - y}{3} - \frac{1 - y}{2} = y \]
\[ y - \frac{(1 - y)}{2} + 4 = 7 \]
\[ \frac{y}{3} - (3 - y) = 4 - y \]
\[ \frac{d - 1}{2} - \frac{d}{3} = 0 \]
\[ \frac{4 - p}{3} = -8 \]

C. Modelling using simple Equations

10. In a triangle the second angle is twice the first and the third angle is three times the first. What are the values of the angles?

11. In the following problems, first formulate an appropriate equation and then solve it.

(a) Suppose Mary travels a certain distance on the first day and twice the distance on the next day. If the total distance she travelled is 60 km, how far does she travel on the first day?

(b) Joy, Pam, Sandra and Lilin each make a donation to the Guide Dogs Association. Sandra gives twice as much as Lilin, Pam gives three times as much as Sandra and Joy gives four times as much as Pam. If their total gift is $132, find the amount of Lilin’s donation, and hence the amount donated by each.

(c) How may litres of a 10% solution of phosphoric acid should be added to 20 litres of a 60% solution to make a 50% solution? All percentages are by volume.

(d) Two unblended manganese ores contain 40% and 25% manganese respectively by weight. How many tonnes of each must be mixed to give 100 tonnes of blended ore containing 35% manganese?

(e) One thousand litres of milk testing 4% butterfat are to be reduced to 3%. How many litres of cream testing 23% butterfat must be separated from the milk to produce the required result? All percentages are by volume.

(f) Tank A contains a mixture of 10 litres of water and 5 litres of frother. Tank B contains 12 litres of water and 3 litres of frother. Both tanks have been thoroughly stirred. How many litres should be taken from each tank and combined to obtain an 8 litre solution containing 25% frother by volume? (Frothers are used in mining to float minerals.)

12. Puzzle A school has 1,000 students and 1,000 lockers. One day all the students line up outside the school. The first student goes in and opens all the lockers. The second student goes in next and closes all the even numbers lockers. The third student goes in and reverses the state (closes the open ones and opens the closed ones) of all lockers that are multiples of 3. The fourth student goes in and reverses the state of all lockers that are multiples of 4. This continues until the last student goes in and reverses the state of the locker that is a multiple of 1,000.

How many lockers are open at the end, and which ones are they?

**Hint** First consider 10 lockers and solve the problem by hand. Look for a pattern. Justify the pattern and then generalise your solution.

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