Converting between Fractions and Decimals

*Do not use a calculator for questions 1 to 5*

1. Convert each fraction to a decimal without using a calculator:

$a) \frac{7}{8}$ b) $\frac{5}{6}$ c) $\frac{1}{7}$ d) $\frac{2}{9}$ e) $\frac{9}{13}$

1. In question one you found $\frac{1}{7}$ as a recurring decimal. Find $\frac{2}{7}, \frac{3}{7, }$ etc, all the way up to $\frac{6}{7}$. What do you notice?
2. What fraction do you think $0.\dot{4}$ is equal to? Why?
3. What fraction do you think $0.\dot{8}$ is equal to? Why?
4. What is $\frac{2}{17}$ as a decimal? You’ll have to work longer than the examples above to find the sequence of repeating digits!

*You may use a calculator for question 6*

1. The fraction $\frac{1}{2}$ has a denominator of 2 and its decimal equivalent terminates. The fractions $\frac{1}{3}$ and $\frac{2}{3}$ have a denominator of 3 and their decimal equivalents do not terminate. Take a fraction with each of the denominators in this table (make sure that they are in their simplest form – if they are not choose another) and determine whether they terminate or recur. Place a tick in the appropriate column.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Denominator | Term. | Recur | Denominator | Term. | Recur | Denominator | Term. | Recur |
| **2** | ✓ |  | **9** |  |  | **16** |  |  |
| **3** |  | ✓ | **10** |  |  | **17** |  |  |
| **4** |  |  | **11** |  |  | **18** |  |  |
| **5** |  |  | **12** |  |  | **19** |  |  |
| **6** |  |  | **13** |  |  | **20** |  |  |
| **7** |  |  | **14** |  |  | **21** |  |  |
| **8** |  |  | **15** |  |  | **22** |  |  |

What do all the denominators that terminate have in common?

Will $\frac{3}{40}$ terminate? What about $\frac{11}{50}$ or $\frac{13}{60}$ ?

ANSWERS

1. a) 0.875 b) $0.8\dot{3}$ c) $0.\dot{1}4285\dot{7}$ d) $0.\dot{2}$ e) $0.\dot{6}9230\dot{7}$
2. The cycle of digits 142857 always form the repeating digits but each fraction starts from a different point. One seventh starts with 1, two sevenths with 2, three sevenths with 4 and so on.
3. Four ninths because it’s twice as big as the recurring decimal for two ninths.
4. Eight ninths. Twice as big as the decimal for four ninths!
5. $0.\dot{1}17647058823529\dot{4}$
6. When the fraction is written in its simplest form only denominators with prime factors of 2 or 5 or both terminate. If the denominator has any prime factor other than 2 or 5 it will not terminate. Therefore only $\frac{13}{60}$

recurs as a decimal.