Topic Check In - 2.04 Ordering fractions, decimals and percentages

1. Arrange the following integers from smallest to largest: 25, ⁻26, 134, ⁻19, 43.

2. Arrange the following decimals from smallest to largest: 0.32, 0.302, −0.4, −0.305, 0.0035.

3. Which symbol from >, < or = goes between $\frac{3}{8}$ and $\frac{1}{3}$? Show your working clearly.

4. Arrange the following numbers from smallest to largest: $\frac{5}{8}$, $\frac{3}{5}$, 63%, 0.61.

5. Write down all of the integers n which satisfy the statement $^{-}2 < n \leq 2$.

6. Julie thinks that because 3 is less than 18, 0.3 is less than 0.18. Explain why she is wrong.

7. Write down a decimal which is between $\frac{3}{8}$ and $\frac{2}{5}$. Justify why your answer lies between these fractions.

8. A bag of apples weighs more than 0.5 kg but less than 0.51 kg. Write down a possible weight of the bag of apples as a fraction. Justify why your answer lies between 0.5 kg and 0.51 kg.

9. Use the digits 1, 2, 5 and 7 once only to form the largest possible negative 4-digit even number.

10. Find three fractions between $\frac{1}{5}$ and $\frac{1}{6}$. Show your working clearly.

Extension

a) Show that: (i) $\frac{1}{2} < \frac{2}{3}$ (ii) $\frac{10}{11} < \frac{11}{12}$ (iii) $\frac{99}{100} < \frac{100}{101}$

b) Complete the last three lines using the pattern in the first three.

$2^2 - 1 = 1 \times 3$
$3^2 - 1 = 2 \times 4$
$4^2 - 1 = 3 \times 5$
$11^2 - 1 = \ldots \times \ldots$
$100^2 - 1 = \ldots \times \ldots$
$n^2 - 1 = (n - 1)(\ldots\ldots)$

c) Use this to show why $\frac{n-1}{n} < \frac{n}{n+1}$.

Answers

1. $^{-}26, ^{-}19, 25, 43, 134$

2. $^{-}0.4, ^{-}0.305, 0.0035, 0.302, 0.32$

3. $\frac{3}{8} = \frac{9}{24}$, $\frac{1}{3} = \frac{8}{24}$ so $\frac{3}{8} > \frac{1}{3}$

4. $\frac{3}{5}$ (= 0.600), 0.61 (= 0.610), $\frac{5}{8}$ (= 0.625), 63% (= 0.630)

5. $^{-}1$, 0, 1 and 2

6. 18 – 3 = 15 so 3 is less than 18 but 0.18 – 0.3 = $^{-}0.12$ so 0.3 is greater than 0.18 or student makes clear reference to place value.

7. $\frac{3}{8}$ = 0.375 and $\frac{2}{5}$ = 0.4 so 0.375 < answer < 0.4.

   e.g. 0.38 because 0.38 – 0.375 = 0.005 so 0.375 < 0.38; similarly 0.4 – 0.38 = 0.02 so 0.38 < 0.4.

8. Any decimal which starts with the digits 0.50…, followed by a digit greater than 0, will do, which would give a fraction with denominator of 1000. Answers may be simplified e.g. $\frac{505}{1000} = \frac{101}{200}$.

   Justified by: $\frac{505}{1000} - \frac{500}{1000} = \frac{5}{1000}$ so $\frac{505}{1000} > \frac{500}{1000}$; similarly $\frac{510}{1000} - \frac{505}{1000} = \frac{5}{1000}$

   so $\frac{505}{1000} < \frac{510}{1000}$.

9. Largest negative even number is $^{-}1572$.

10. $\frac{1}{5} = \frac{6}{30} = \frac{24}{120}$, $\frac{1}{6} = \frac{5}{30} = \frac{20}{120}$, so $\frac{21}{120}$, $\frac{22}{120}$ and $\frac{23}{120}$ would do (simplifying to $\frac{7}{40}$, $\frac{11}{60}$ and $\frac{23}{120}$) but there are other answers.

Extension

a) (i) $\frac{1}{2} = \frac{3}{6}$, $\frac{2}{3} = \frac{4}{6}$ so $\frac{1}{2} < \frac{2}{3}$ (ii) $\frac{10}{11} = \frac{120}{132}$, $\frac{11}{12} = \frac{121}{132}$ so $\frac{10}{11} < \frac{11}{12}$

(iii) $\frac{99}{100} = \frac{9999}{10000}$, $\frac{100}{101} = \frac{10000}{10100}$ so $\frac{99}{100} < \frac{100}{101}$

b) $11^2 - 1 = 10 \times 12$
$100^2 - 1 = 99 \times 101$
$n^2 - 1 = (n - 1)(n + 1)$

c) $\frac{n-1}{n} = \frac{(n-1)(n+1)}{n(n+1)} = \frac{n^2-1}{n(n+1)}$

$\frac{n}{n+1} = \frac{n^2}{n(n+1)}$ so $\frac{n-1}{n} < \frac{n}{n+1}$

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AO1	1	Order positive and negative integers.			
AO1	2	Order positive and negative decimals.			
AO1	3	Compare the size of fractions.			
AO1	4	Order fractions, decimals and percentages.			
AO1	5	Understand the symbols <, ≤.			
AO2	6	Understand place value.			
AO2	7	Convert between fractions and decimals.			
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