Number Theory

ROUNDING OFF USING SIGNIFICANT FIGURES

When using the scientific notation function on a calculator an understanding of significant figures is necessary. Rounding answers to a stated number of significant figures is to give the most relevant or important digits of the number.

When approximating to a certain number of significant figures,

- the first significant figure is the first **non-zero** digit;
- zeros between non-zero digits are significant;
- zeros at the end of a decimal are significant;
- zeros at the end of a whole number are **not** significant;
- zeros at the beginning of a decimal are **not** significant;

the value of next digit following the last significant digit must be considered i.e. Round up if the next digit is 5, 6, 7, 8 or 9
do nothing if the next digit is 0, 1, 2, 3 or 4.

When using the scientific notation function on a calculator it is necessary to state the number of significant figures required, and this overcomes the difficulty of knowing when a zero is significant.

Examples:

(i) 0.008 28 rounded to 1 significant figure is 0.008
as the zeros to the left of 8 are not significant

(ii) 0.003 5 rounded to 1 significant figure is 0.004
as 3 is the first significant figure and 5 (the next digit) necessitates rounding up the 3.

(iii) 8.074 rounded to 2 significant figures is 8.1
as 8 and 0 are significant and 7 requires rounding up the 0.

(iv) 65 000 written to 3 significant figures is still 65 000
as the final two 0s are required to hold place value.

(v) 63.70 has been written to 4 significant figures
(zeros at the end of a decimal are significant)

(vi) 0.003 05 has been rounded to 3 significant figures
(a zero between non-zero digits is significant)

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REVIEW EXERCISE – LEVEL 2

1. Round off in the way indicated:

   (a) 534 698 (to 3 significant figures)

   (b) 0.003 546 (to 2 decimal places)

   (c) 5.84×10^{-6} (to 2 significant figures)

   (d) 3.95×10^{-1} (to 2 decimal places)

2. Calculate, leaving answers in scientific notation to 2 significant figures:

   (a) $\pi \times (3.2 \times 10^{-2})^2$

   (b) $\sqrt{(4.1\times10^{3})^2 - (3\times10^{3})^2}$

   (c) $(2.3 \times 10^{3}) + (9.8 \times 10^{-2}) \div (4.5 \times 10^{3})$

3. Use the fraction key on your calculator to calculate:

   (a) $\frac{3}{4}+\frac{2}{3}-\frac{1}{2}$

   (b) $5\frac{3}{5}\times4\frac{1}{7}$

   (c) $8\frac{1}{2}+3\frac{1}{4}\times\frac{2}{13}$

   (d) $\dfrac{6\frac{1}{3}+5\frac{2}{5}}{8\frac{1}{4}-4\frac{2}{3}}$

   (e) $\frac{5}{6}$ of 624

   (f) $\dfrac{\frac{7}{3}-\frac{2}{5}}{\frac{4}{7}\times\frac{3}{8}}$

4. Simplify the following, writing answers in standard notation:

   (a) $\dfrac{6.348\times10^{5}}{2.3\times10^{-3}\times3.1\times10^{4}}$

   (b) $\dfrac{1.9\times10^{-3}\times2.4\times10^{4}}{8\times10^{4}}$

   (c) $\dfrac{3.98\times10^{4}\times 6.42\times10^{-5}}{1.592\times10^{-3}\times 1.07\times10^{7}}$

   (d) $\dfrac{9.81\times10^{-3}\times 5.74\times10^{-6}}{2.87\times10^{2}\times 1.635\times10^{-4}}$

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REVIEW EXERCISE – LEVEL 1

1. Change to decimals:

   (a) 35% (b) 260% (c) 8% (d) 14.6% (e) 1.4%

2. Change to percentages:

   (a) $\frac{1}{4}$ (b) $1\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 0.452 (e) 0.05

3. Increase: (a) 450 by 15%

   (b) $35 by 22%

   (c) 600 mL by 120%

4. Decrease (a) 250 by 42%

   (b) 800 mL by 8%

   (c) $54.60 by 25%

5. (a) A town's population increases from 15 500 to 18 100. What percentage increase is that?

   (b) In a school of 840 students, 45% are boys. How many girls are there?

   (c) A 20% discount meant that Jim saved $16.40. What should he have paid?

6. (a) A shopkeeper buys jeans for $45 and sells them at a 35% profit. What is the selling price?

   (b) The cost price of a car is $23 000 and it is sold for $35 600. Express profit as a percentage of cost.

7. (a) A car seller receives a 5% commission on sales. How much does he receive on selling a car for $35 000?

   (b) Calculate the simple interest on an investment of $5 000 at 6½ % over 4 years.

   (c) A helicopter bought for $150 000 depreciates by 15% per year. How much is it worth at the end of the first year?

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REVIEW EXERCISE – LEVEL 2

1. Change to decimals:

   (a) $42\frac{1}{2}\%$ (b) $66\frac{2}{3}\%$ (c) $162\frac{1}{4}\%$ (d) 0.5% (e) 1.04%

2. (a) What percentage is 56 of 80?

   (b) What percentage is 4.3 L of 20 L?

   (c) What percentage is \$4.80 of \$42.60?

3. (a) Increase 165 by $12\frac{1}{2}\%$ (b) Decrease 18.6 by $33\frac{1}{3}\%$

4. (a) A shop offers a discount of 15% on all items. What would you pay for an item whose original price was \$78.50?

   (b) A bank increases all its charges by 1.4%. If an account originally cost \$25 per month to keep, what is the new cost?

5. (a) A tradesman buys goods retailing at \$2500 and then receives a 15% trade discount. If he pays within 30 days, he receives a further 5% reduction on the discounted price. How much does he pay if he settles the account after 15 days?

   (b) A city's population increased by 1980 or 9%. What was the city's new population?

   (c) A woman pays \$150 for a dress which was discounted by 40%. What was the original price?

6. (a) Terry buys a box of 50 pencils for \$12.00. If he wants to make a 25% profit on reselling them, how much should he charge per pencil?

   (b) A builder made a 40% profit by selling a house for \$315 000. How much did it cost to build the house?

7. Maria borrows \$900 and repays it at \$84 per month over 12 months. What simple interest rate is she paying?

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