$$\begin{array}{r} \overset{1}{3}.\overset{1}{7}9 \\ 1.60 \\ 4.22 \\ +1.15 \\ \hline 10.76 \end{array}$$

It is 10.76m around the shape.

(g) Cost = \$4.55+\$3.75+\$1.35

$$\begin{array}{r} \overset{1}{4}.\overset{1}{5}5 \\ 3.75 \\ +1.35 \\ \hline 9.65 \end{array}$$

Change will be \$10 - \$9.65

$$\begin{array}{r} \cancel{1}^{0}\cancel{0}^{\cancel{10}\,9}.\cancel{0}^{\cancel{10}\,9}\cancel{0}^{10} \\ -9.\ 6\ 5 \\ \hline 0.\ 3\ 5 \end{array}$$

Change is \$0.35 or 35 cents

Multiplying and dividing decimals

1\. (a) Add a zero, move the decimal point 4 places to the right.

8.3420×10000
$= 83420$

(b) Add a zero, move the decimal point 3 places to the right.

$^{-}0.850 \times 1000$
$= {}^{-}850$

(c) Remove the decimal points.

$$\begin{array}{r} \overset{2}{4}7 \\ \times 4 \\ \hline 188 \end{array}$$

There are 3 decimal places in answer.
Answer is 0.188

(d) Remove decimal points and signs.

$$\begin{array}{r} \overset{2}{4}5 \\ \times 12 \\ \hline 90 \\ +4\overset{}{5}0 \\ {}^{1} \\ \hline 540 \end{array}$$

There are 2 decimal places in answer. A negative x a positive →a negative
Answer is $^{-}5.40$

(e) Move the decimal point 3 places to the left.

$363.425 \div 1000$
$= 0.363425$

(f) Move the decimal point 2 places to the left.

$000.4795 \div 100$
$= 0.004795$

(g) Multiply both numbers by 10 to become
$60360 \div 3$

$$3\overline{)60360}\quad 20120$$

Answer is 20 120

(h) Remove signs and multiply both numbers by 10 to become
$1435 \div 7$

$$7\overline{)1435}\quad 205$$

A negative ÷ a positive → a negative
Answer is $^{-}205$

(i) Remove signs and multiply both numbers by 100 to become
$880190 \div 6$

$$\begin{array}{r} 1\,4\,6\,6\,9\,8.\,\overline{3} \\ 6\overline{)8\,{}^{2}8\,{}^{4}0\,{}^{4}1\,{}^{5}9\,{}^{5}0.{}^{2}0\,{}^{2}0} \end{array}$$

A positive ÷ a negative →a negative.
Answer is $^{-}146\,698.\overline{3}$ or $^{-}146\,698.3333$ to 4d.p.

2.
$$\begin{array}{r} \overset{1}{4}\overset{\cancel{1}}{2}5 \\ \times\ 23 \\ \hline 1275 \\ +8500 \\ \hline 9775 \end{array}$$
There are 2 digits after the decimal point, the answer is \$97.75

3. Jan paid \$125 + 12 x \$65.42
$$\begin{array}{r} \overset{1}{6}542 \\ \times\ 12 \\ \hline 13084 \\ +65\underset{1}{4}20 \\ \hline 78504 \end{array}$$
Answer = \$785.04 + \$125
$$\begin{array}{r} \overset{1}{7}\overset{1}{8}5.04 \\ +125.00 \\ \hline 910.04 \end{array}$$
Jan paid \$910.04

4. John earnt \$456.90 for 30 hours work, what was his hourly rate?
This becomes $456.90 \div 30$, first $\div 10$ and then $\div 3$

First $456.90 \div 10 = 45.69$ then $3\overline{)4^{1}5.69}$ giving 15.23. Answer is \$15.23 per hour.

5. Method 1:

Along the length of the room, there is $5.35 \div 0.3$ tiles, which is 18 tiles (with some waste).

Along the width of the room, there is $4.75 \div 0.3$ tiles, which is 16 tiles (with some waste).

Number of tiles required is 18 x 16 = 288

Method 2:

Area of 1 tile = 0.3 x 0.3 =0.09 m^2
Area of the floor = 5.35 x 4.75 = 25.4215 m^2 (Calc.)

Number of tiles = 25.4215 ÷ 0.09 = 282.46 ≈ 283

Working:
$$3\overline{)5^{2}3.^{2}5^{1}0} = 17.8\dot{3}$$
$$3\overline{)4^{1}7.^{2}5^{1}0} = 15.8\dot{3}$$
$$\begin{array}{r} \overset{4}{1}8 \\ \times 16 \\ \hline 108 \\ +180 \\ \hline 288 \end{array}$$

Which answer is better?
Method 1 takes into account the waste when tiles are cut, so Method 1 is the best answer. In a practical situation a tiler would probably order 300 tiles to allow for breakages and pattern matching.

Significant figures

1) State the number of significant figures in the numbers below.
   a) 34.8 — 3 significant figures
   b) 90.12 — 4 significant figures

c) 0.00521 3 significant figures
d) 125 000 3 significant figures
e) -8.40 3 significant figures
f) 40.06 4 significant figures
g) 450mL (0.450L) 3 significant figures
h) 6.02×10^{23} 3 significant figures

2) Write the numbers below to the number of significant figures indicated.
a) 0.002341 to 2 significant figures 0.0023
b) 39.50 to 2 significant figures 40
c) 56 750 to 3 significant figures 56 700
d) 5.2391 to 4 significant figures 5.239
e) 755 826 to 3 significant figures 756 000

3) For the following instrument readings, state (i) the reading to 2 sig. figs, (ii) the absolute error and (iii) the percentage error.

instrument reading	reading to 2 sig. figs	absolute error	the percentage error
1.44 ± 0.02	1.4	0.02	1.4%
36.55 ± 0.05	37	0.05	0.14%
$3\,675 \pm 5$	3 700	5	0.14%
3.6 ± 0.05	3.6	0.05	1.4%
450 ± 15	450	15	3.3%

4) Perform the following calculations using the measurements given
   a) (4.55 ± 0.02) + (2.51 ± 0.05) = 7.06 ± 0.07
   b) (26.7 ± 0.05) – (5.7 ± 0.05) = 21 ± 0.1

5) A steel can is measured for radius and height. The radius is 2.5 ± 0.1 cm and the height is 12.5 ± 0.1 cm
   a) Calculate the area of the base using $A=\pi r^2$ *where* π*=3.1415926*

$$
\begin{aligned}
A &= \pi r^2 \\
&= 3.1415926 \times (2.5 \pm 4\%)^2 && \bullet\ \pm 0.1 = 4\% \\
&= 19.63 \pm 8\% && \bullet\ \textit{error doubled due to squaring} \\
&= 20 \pm 1.6\ cm^2 && \bullet\ \textit{radius is expressed to 2 sf, answer expressed to 2 sf.}
\end{aligned}
$$

   b) Using the result of a) calculate the volume of the can using $V = Ah$.

$$
\begin{aligned}
V &= Ah \\
&= 20 \pm 1.6 \times 12.5 \pm 0.1 && \bullet\ \textit{express each error as a \%} \\
&= 20 \pm 8\% \times 12.5 \pm 0.8\% && \bullet\ \textit{multiply measurements, add \% errors} \\
&= 250 \pm 8.8\% && \bullet\ \textit{express answer to 2 sf, change \% error to error} \\
&= 250 \pm 22 cm^3
\end{aligned}
$$

6) The stream discharge rate $Q\left(m^3/\sec\right)$ is calculated by the equation $Q = Av$ where *A* is the cross-sectional area of the stream and *v* is the velocity of the water.

The measured value of A is 4.6 ± 0.2 m^2 and flows at a velocity of 1.6 ± 0.2 m/sec.

Calculate the stream discharge rate.

$$
\begin{aligned}
Q &= Av \\
&= 4.6 \pm 0.2 \times 1.6 \pm 0.2 \\
&= 4.6 \pm 4.3\% \times 1.6 \pm 12.5\% \\
&= 7.36 \pm 16.8\% \\
&= 7.4 \pm 1.24 m^3/\sec
\end{aligned}
$$