Department of Mathematics

# N4 Applications of Mathematics

# Prelim Revision

- # Numeracy
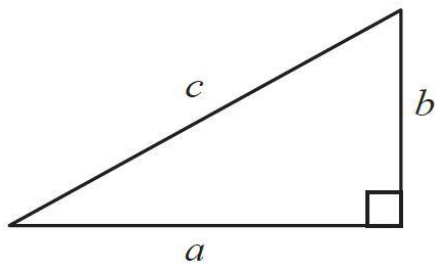
- # Geometry & Measures

# N4 Applications of Mathematics

## Formulae list

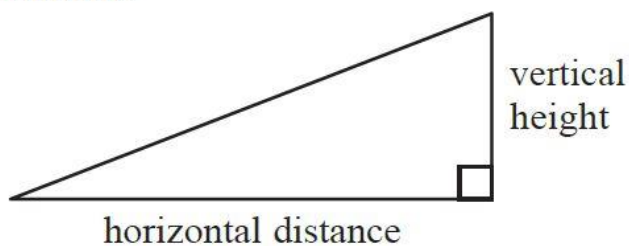Circumference of a circle: $C = \pi d$

Area of a circle: $A = \pi r^2$

Theorem of Pythagoras:

$$a^2 + b^2 = c^2$$

Gradient:

$$\text{Gradient} = \frac{\text{vertical height}}{\text{horizontal distance}}$$

## Add/Subtract/Multiply/Divide

1.      At four shops Fiona spends the following amounts:   £14.78, £7.45, £5.10 and £10.54.

   **(a)**     How much did Fiona spend altogether?

   **(b)**     How much did she have left from £50?

2.      A can of juice costs 30p.

   **(a)**     How many cans could be bought for £1.30.

   **(b)**     How much money would be left over?

3.      A netball team consists of 7 players.

   **(a)**     How many teams can be formed from 60 people?

   **(b)**     How many would have to sit out?

4.      A gardener has 329 plants which he wants to put in rows of 12.

   How many rows will he plant and how many plants will be left over?

5.      Mrs. Mackay bought a packet of tea costing £3.47and a packet of sugar costing 98p.

   How much did she spend altogether?

6.      Margaret gets £25 a week for pocket money. She spends £14.65 on bus fares, £4.75 on sweets and she saves the rest.

   **(a)**     How much does she spend on bus fares and sweets?

   **(b)**     Margaret is saving up to buy a new bike which costs £187. How many weeks will it take her to save enough to buy her bike?

7.      Stewart has £50 to buy some presents. He is going to buy a computer game costing £15.99, a book costing £12.75 and some perfume costing £22.40.

   Does he have enough money to buy all of these?

## Fractions

**8.** Find the following:

    **(a)** $\dfrac{3}{4}$ of 256 m       **(b)** $\dfrac{2}{5}$ of £400       **(c)** $\dfrac{5}{8}$ of £308

**9.** There are 48 sweets in a packet. $\dfrac{3}{4}$ of them are citrus flavours.
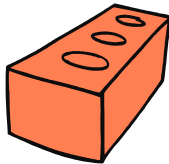
    How many citrus sweets are there in the packet?

**10.** In a class of 24 pupils $\dfrac{7}{8}$ of them are present.

    **(a)** How many pupils are present?

    **(b)** How many are absent?

## Volume of Cube and Cuboid

**11.**      Find the volume of a concrete block measuring 36cm by 18cm by 12cm.

**12.** A classroom measures 9m by 7m by 3m.



    How many pupils can it hold if each pupil need 6m$^3$ of air space?
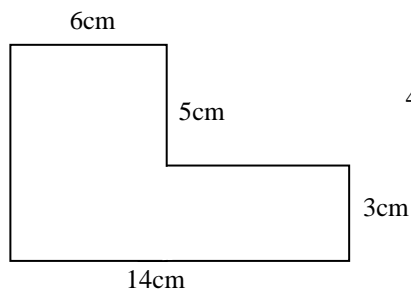
**13.**      **(a)** Find the volume of a swimming pool which measures 1500cm by 1000cm by 200cm.

    **(b)** If 1litre = 1000cm$^3$, calculate the number of litres of water that the pool will hold.
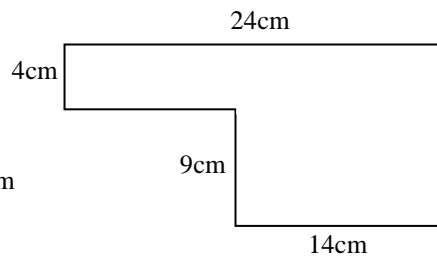
## Finding Area and Perimeter of shapes

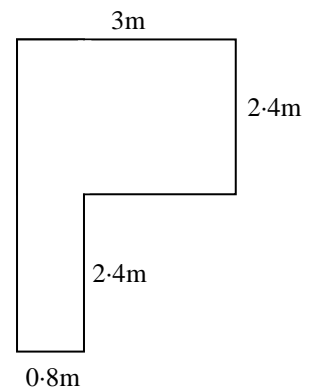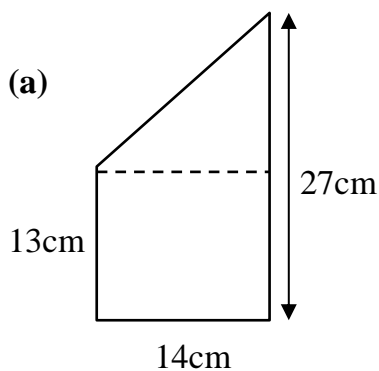**14.** Calculate the **perimeter** of each shape below :

(a)

6cm

5cm

3cm

14cm

(b)

24cm

4cm

9cm

14cm

(c)

3m

2·4m

2·4m

0·8m

**15.** Find the **area** of each of the shapes shown below.

**(a)**

27cm

13cm

14cm

**(b)**

80cm

25cm

70cm

**(c)**

24cm

24cm

50cm
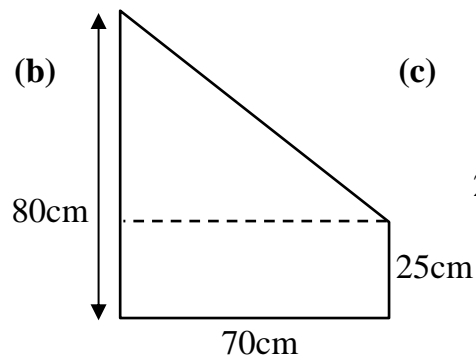
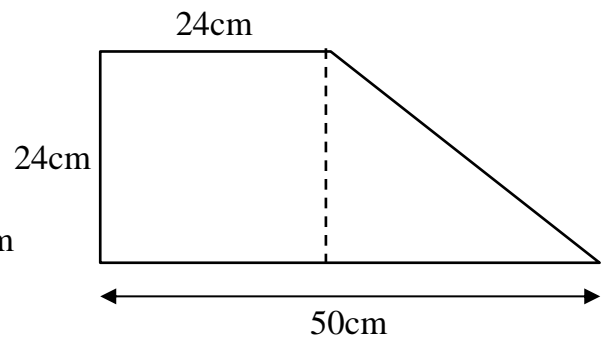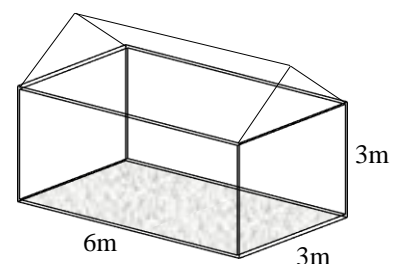**16.** A man decides to paint the four inside walls of his garage and to re-concrete the floor.

The paint costs £1.20 per square metre to apply and the concrete £6.80 per square metre.
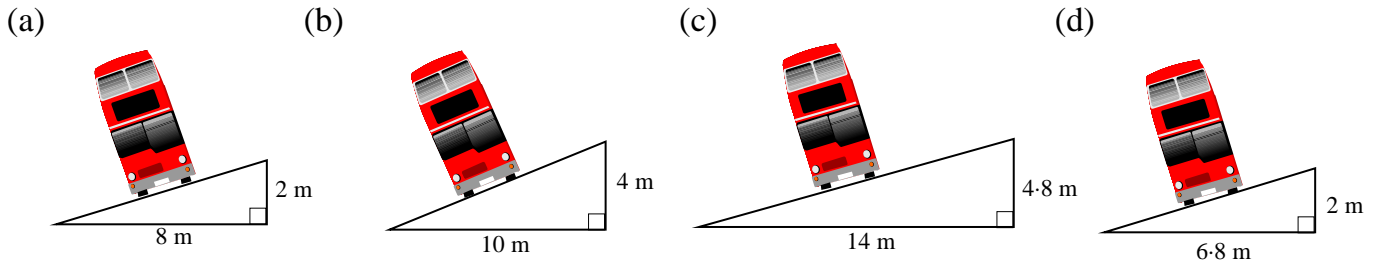
Calculate the total cost of his DIY.

3m

6m

3m

## Gradient and Slope

**17.** To test the stability of a bus a tilting platform is used.

It is known that a bus will topple if the gradient of the slope between the platform and the ground is greater than 30%
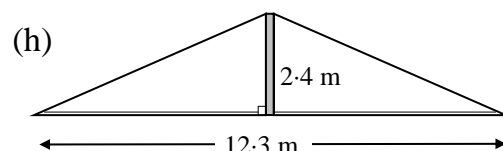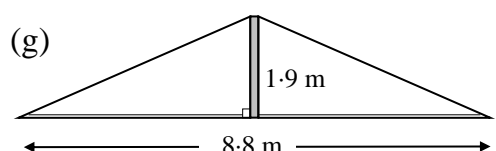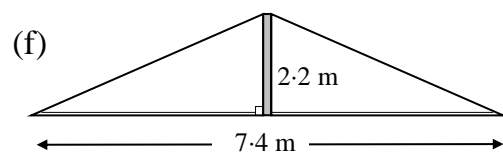
Which of the buses below would topple?

(a)

2 m

8 m

(b)

4 m

10 m

(c)

4·8 m

14 m

(d)

2 m

6·8 m

**18.** To comply with building regulations the slope of a roof

must have a gradient of between 40% and 50%.

$v$

$h$
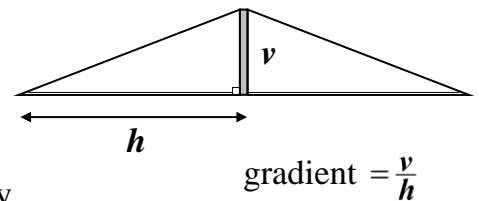
Which of the roofs below comply, and which do not comply,

with building regulations?

gradient $= \dfrac{v}{h}$

**The diagrams are not drawn to scale!**

(a)
(b)

1·8 m

4 m

(b)

2·1 m

6 m

(c)

1·4 m

3·6 m

(d)

4·5 m

8 m

(e)

1·5 m

6·2 m

(f)

2·2 m

7·4 m

(g)

1·9 m

8·8 m

(h)

2·4 m

12·3 m

*N4 Applications of Mathematics*
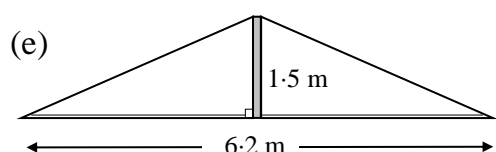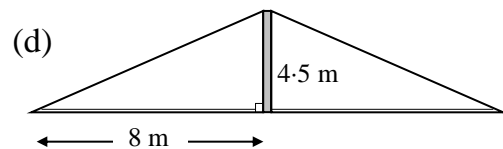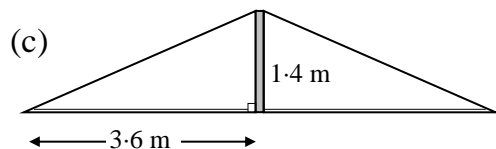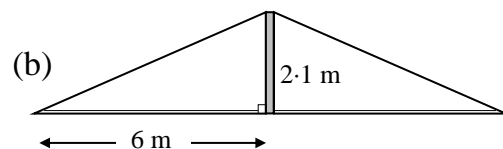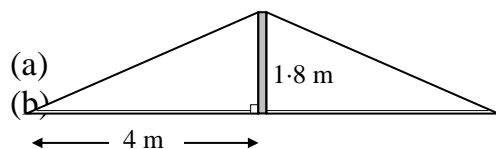
## Pythagoras' Theorem

**19.** Calculate the height of each tree, rounding your answers to 1 – decimal place.

15 m     *h*     13 m

*h*    27 m    23 m

56 m    *h*    48 m
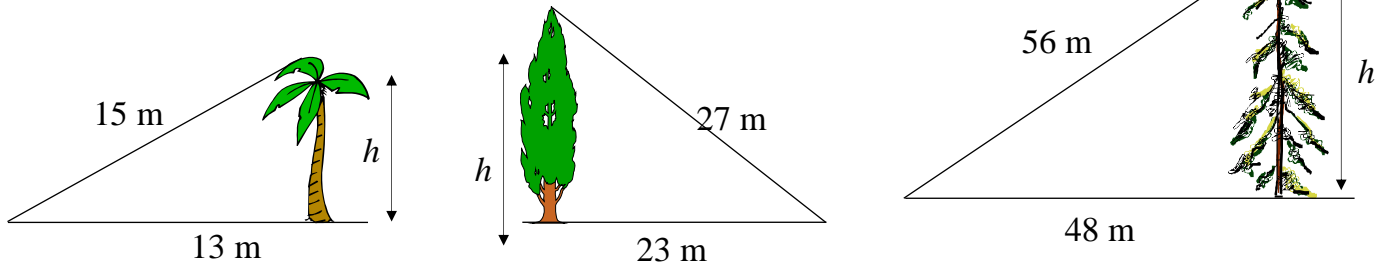
**20.** A ladder leans against a wall as shown in the diagram opposite.
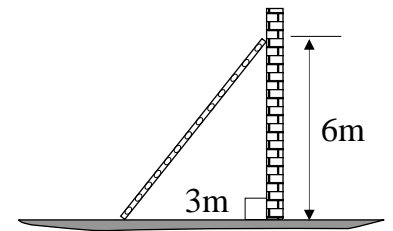
From the information given calculate the length of the ladder.

6m

3m

**21.** Calculate the perimeter of each shape below.

12cm

8cm

17cm

5m

12m

7m

13m
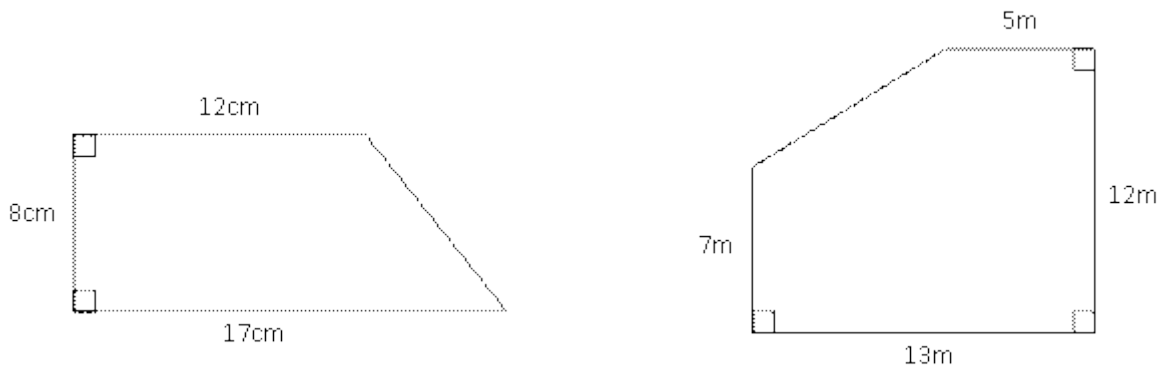
## Bearings and Scale Drawings

**22.** The bearing of ship B from ship A is 050° and the bearing of ship C from ship B is 154°.

Distances are shown on the sketch.

**Use a scale of 1cm to 2km.**

Make an accurate drawing of this diagram.

Measure the bearing and distance of ship A from ship C.

N

154°

N   10km   B

050°    18km

A

?     N

C   ?

## Time Intervals, Duration and Timetables

**23.** Study the timetable opposite and answer the following questions.

| Falkirk | 0555 | 0625 |
|---|---|---|
| Denny | 0612 | 0642 |
| Bonnybridge | 0618 | ...... |
| Banknock | 0627 | 0652 |
| Kilsyth | 0647 | 0712 |

(a) This timetable repeats itself every hour, the last bus leaving Falkirk at 2125.
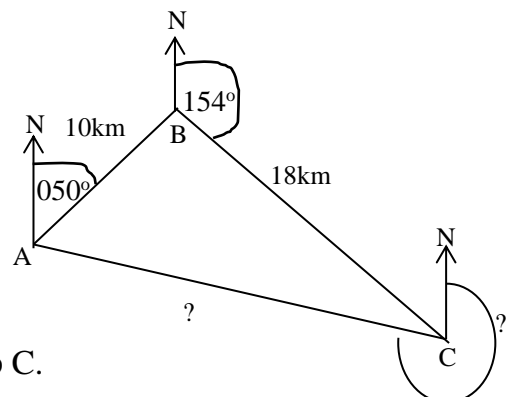At what time does this bus arrive in Glasgow?

(b) Marie stays in Bonnybridge and has a dental appointment in Kilsyth at 3·30pm.
At what time will Marie have to catch the bus in Bonnybridge?

(c) The 0555 bus leaves Glasgow at 0745 to return to Falkirk, stopping in the same places.
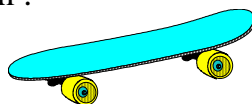Write out the timetable for the return journey.

## Problems Involving Percentages

**24.** The following items are to be reduced in price by 10% for a sale.
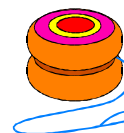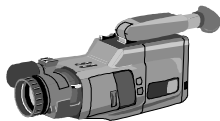Calculate the sale price of each item :

Skate Board

£24

Yo Yo

£12

Clock Radio

£35

CD Player

£123.70

Cool Shades

£16.50

Video Camera

£462

## Tolerance and Calculations

**25.** A company producing matches sells them in various box sizes.
The largest box they sell has its contents marked on the box as

contents : $(240 \pm 11)$ matches

A random sample of boxes is taken and their contents checked.
The number of matches in each
box in the sample is shown below.

238   241   237   241   240   240   252   248   231   233   229   224
249   244   228   255   254   236   241   246   237   227   252   230

If more than 20% of the boxes in any sample are either above or below the tolerance limits then the packing machine needs to be serviced.
Does the packing machine need to be serviced? Explain your answer fully.

## Foreign Currency
**26.** Use the exchange rate, £1 = \$2.31 (US). How many US dollars would you get for £300.

# ANSWERS

## Add/Subtract/Multiply/Divide:

1.  **(a)** £37.87 **(b)** £12.13
2.  **(a)** 4 cans **(b)** 10p
3.  **(a)** 8 teams **(b)** 4 people
4.  27 rows with 5 plants over
5.  £4.45 **6.** **(a)** £19.40 **(b)** 34 weeks
7.  £1.14 short

## More fractions

8.  **(a)** 192m **(b)** £160 **(c)** £192.50
9.  36 sweets **10.** **(a)** 21 **(b)** 3

## Volume of Cube and Cuboid

**11**. 7776 cm$^3$ **12**. 31 pupils **13**. **(a)** 300 000 000cm³ **(b)** 300 000 litres

## Perimeter and Area:

14.  (a) 44cm (b) 74cm (c) 15·6cm
15.  (a) 182 cm$^2$ + 98 cm$^2$ = 280 cm$^2$ (b) 1750 cm$^2$ + 1925 cm$^2$ = 3675 cm$^2$
     (c) 576 cm$^2$ + 312 cm$^2$ = 888 cm$^2$
16.  **Walls** = 54m$^2$ x £1.20 = £64.80, **Floor** = 18m$^2$ x £6.80 = £122.40
     **Total** = £64.80 + £122.40 = **£187.20**

## Gradient:

17.  (a) No (b) Yes (c) Yes (d) No
18.  (a) Yes (b) No (c) No (d) No
     (e) Yes (f) No (g) Yes (h) No

## Pythagoras' Theorem:

**19.** 7·5m; 14·1m; 28·8m **20.** 6·7m **21.** (a) 46·4cm (b) 46·4cm

## Bearings and Scale Drawings

22.  18·6km on 300º

## Time Intervals, Duration and Timetables

23.  (a) 2300 (b) 1418 (c) 0745, 0753, 0810, 0833, 0902, 0908, 0925

## Problems Involving Percentages

24.  Clock Radio: £31.50; Skate Board: £21.60 Yo Yo: £10.80
     Video Camera: £415.80 CD Player: £111.33 Cool Shades: £14. 85

## Tolerance and Calculations

25.  7 out of 24, 7 ¸ 24 ´ 100 = 29% which is more than 20% outside tolerance levels so the packing machine needs to be serviced.

## Foreign Currency

26.  2.31 x 300 = $693