

## USING FORMULAE

You need to know how to

- evaluate expressions and make substitutions in formulae
- work from given word formulae and algebraic formulae
- produce results from both the above

Remember	$2a$ means $2 \times a$	$\frac{2}{a}$	means $2 \div a$
	$2(a + b)$ means $2 \times (a + b)$		

### Examples of formulae

#### Calculating Pay

$$P = \text{hours worked} \times r + \text{bonus}$$

$P$  = total pay

$r$  = rate of pay

#### Convert degrees Fahrenheit ( $F^{\circ}$ ) to degrees Celsius ( $C^{\circ}$ )

$$C = (F - 32) \times \frac{5}{9}$$

Convert  
currency  
 $\text{€ } 1 = \text{£}0.68$

Find the perimeter  
of a rectangle  
 $P = 2(l + w)$

#### Calculating printing costs

$$C = 27 + 0.4 \times n$$

$C$  = costs in £ and

$n$  = number of leaflets

### Questions

- The temperature in Reading was  $74^{\circ}$  Fahrenheit. What is this in Celsius?
- The temperature in Moscow is  $-5^{\circ}$  Fahrenheit. What is this in Celsius?
- Find the perimeter of a rectangle with length 8cm and width 9cm.
- A travel agent sells currency without a commission charge for people who book their holiday with them. If the exchange rate is  $\text{€}1 = \text{£}0.68$  how many €s would you get for  $\text{£}250$ ?

5. A cake shop calculates its profit using the formulae to the right.

They sell doughnuts for 80p each.

The ingredients for each cake cost them 12p and their overheads add another 8.5p to their costs. How much profit do they make on selling 100 doughnuts?

$$P = n (\text{selling price}) - n (\text{overheads} + \text{ingredients})$$

Where  $n$  = number of cakes  
 $P$  = total profit

- Using the printing costs formula above how much does it cost to print 250 leaflets?

Using this 'printing costs' formula work out the following:

### Calculating printing costs

$$C = 27 + 0.4 \times n$$

C = costs in £ and  
n = number of leaflets

1. The cost of producing 50 leaflets.
2. The cost of producing 1000 leaflets.
3. If you had £850, approximately how many leaflets would you be able to print?
4. You want to print 25 leaflets. How much will this cost you?
5. The printer offers a discount of 10% on the total order if you order more than 2000 copies of your leaflet. How much will it cost to print 5000 leaflets?
6. The printer offers £20 off for all repeat orders as long as the original order was for 1000 or more copies. Jackson & Co originally order 5000 copies and then needed another 1000. How much did this repeat order cost?
7. Orders for more than 10,000 copies get a special discount of 15% off the total cost. How much does it cost to print 20,000 copies?
8. Using the above discount rate work out how much a customer would save on a print run of 50,000?
9. If the cost of an order is going to be more than £1000 the printer asks for a deposit of 20%. Calculate the number of copies to the nearest 100 that could be ordered without having to put down a deposit.
10. In one week the printer produced 2,000,000 for a customer. What is the total cost before any discounts?

## Answer sheet

### Page 1

1.  $C = (74 - 32) \times 5/9 = 23.3^{\circ}\text{C}$  (**23°C**)
2.  $C = (-5 - 32) \times 5/9 = -20.5^{\circ}\text{C}$  (**21°C**)
3.  $P = 2(8 + 9) = 2 \times 17 =$  **34cm**
4.  $\text{£}250 \div 0.68 = \text{€}367.64$  (round answer down, so you would get **€367**)
5. Profit =  $100 \times 80 - 100(8.5 + 12) = 8000 - 100 \times 20.5$   
 $= 8000 - 2050 = 5950\text{p} =$  **£59.50**
6.  $C = 27 + 0.4 \times 250 = 27 + 100 =$  **£127**

### Page 2

1.  $C = 27 + 0.4 \times 50 = 27 + 20 =$  **£47**
2.  $C = 27 + 0.4 \times 1000 = 27 + 400 =$  **£427**
3. Approximately **2000** leaflets. Tips: use answer from Q2 above to estimate or 'work backwards' e.g.  $\text{£}850 - 27 = 823$  which is roughly 800.  $800 \div 0.4 = 2000$  or to work out exactly:  $823 \div 0.4 = 2057.5$  (2057 leaflets)
4.  $C = 27 + 0.4 \times 25 = 27 + 10 =$  **£37**
5.  $C = 27 + 0.4 \times 5000 = 27 + 2000 =$  **£2027**  
10% of  $\text{£}2027 = \text{£}202.70$   
 $\text{£}2027.00 - \text{£}202.70 =$  **£1824.30**
6. 1000 copies cost  $\text{£}427$  (see Q2)  
 $\text{£}427 - \text{£}20$  (discount) = **£407**
7.  $C = 27 + 0.4 \times 20\,000 = 27 + 8\,000 =$  **£8027**  
10% of  $\text{£}8027 = \text{£}802.70$ , therefore 5% of  $\text{£}8027 = \text{£}401.35$   
and  $\text{£}15\% = \text{£}1204.05$ . So total cost =  $\text{£}8027.00 - \text{£}1204.05 =$  **£6822.95**
8.  $C = 27 + 0.4 \times 50\,000 = 27 + 20\,000 =$  **£20\,027**.  
15% of  $20\,027 = 3004.05$ . So total cost =  $\text{£}20\,027 - \text{£}3\,004.05 =$  **£17\,022.95**
9. **2400 leaflets** would cost  $\text{£}987$ . (Use previous answers to help estimate)
10.  $C = 27 + 0.4 \times 2\,000\,000 = 27 + 800\,000 =$  **£800\,027**