Name:

Exam Style Questions

Forming and Solving Equations

Corbettmaths

Equipment needed: Pen, calculator

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

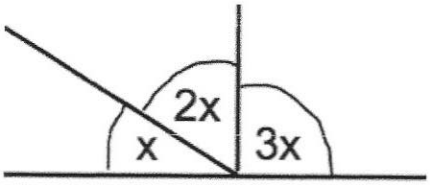
Video Tutorial

www.corbettmaths.com/contents

Videos 114, 115

Answers and Video Solutions

1. Three angles made up a straight line.



(a) Form an equation in x.

$x + 2x + 3x = 180$

$6x = 180$

$6x = 180$

$6x = 180$

(2)

(b) Solve the equation to find the value of x

$6x = 180$

$\div 6 \quad \div 6$

$x = 30$

$x = 30°$

(2)

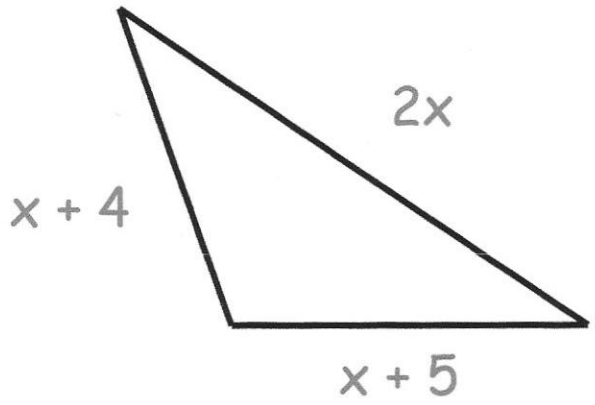
(c) Work out the size of the largest angle.

30×3

$90°$

(1)

2. The diagram below shows a triangle.
The sides are measured in centimetres.



(a) Write an expression, in terms of x, for the perimeter of the triangle.

$(x+4)+(x+5)+2x$

$4x+9$

.....

(2)

The perimeter of the triangle is 61cm

(b) Write down an equation in terms of x.

$4x+9=61$

.....

(1)

(c) Solve the equation to find x.

$4x+9=61$

$-9 \quad -9$

$4x=52$

$\div 4 \quad \div 4$

$x=13$

13

.....

(2)

3. A child bus ticket costs £x
An adult bus ticket costs £9

Diona bought three child bus tickets and five adult bus tickets.

The total price of the bus tickets was £63 $3x$ $5 \times 9 = 45$

Find the price of a child bus ticket.

$3x + 45 = 63$

$-45 \quad -45$

$3x = 18$

$\div 3 \quad \div 3$

$x = 6$

£ 6

(3)

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4. Sarah is x years old.
Thomas is 3 years older than Sarah.
David is twice as old as Sarah.
The total of their ages is 51.

(a) Write an expression for Thomas's age in terms of x.

$x + 3$

(1)

(b) Write an expression for David's age in terms of x.

$2x$

(1)

(c) Form an equation in x and solve it to work out Sarah's age.

$x + (x + 3) + 2x = 51$

$4x + 3 = 51$

$-3 \quad -3$

$4x = 48$

$\div 4 \quad \div 4$

$x = 12$

12

(2)

5. James has x pence.
Hannah has 5 pence more than James. $x+5$
Liam has 2 pence less than James. $x-2$

The total amount of money they have is 75 pence.

(a) Use this information to write down an equation in x.

$x + (x+5) + (x-2) = 75$

$3x + 3 = 75$

$3x+3=75$

(2)

(b) Solve the equation to find out how much money James has.

$3x + 3 = 75$

$-3 \quad -3$

$3x = 72$

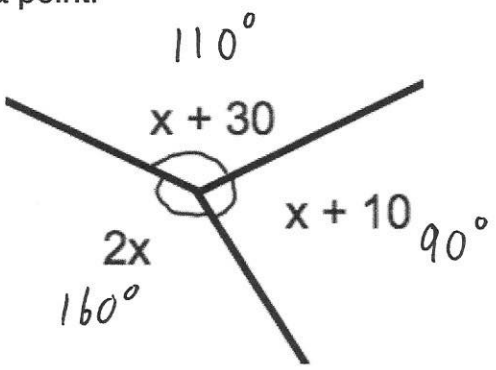
$\div 3 \quad \div 3$

$x = 24$

24 pence

(2)

6. Three angles meet at a point.



Calculate the size of the largest angle.

$4x + 40 = 360$

$-40 \quad -40$

$4x = 320$

$\div 4 \quad \div 4$

$x = 80$

160 .....°

(4)

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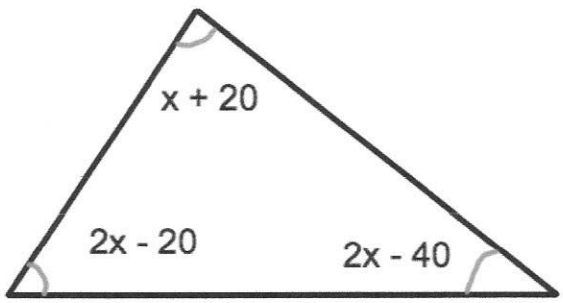
7. Shown is a triangle.



Work out the value of x.

$5x - 40 = 180$

$+40 \quad +40$

$5x = 220$

$\div 5 \quad \div 5$

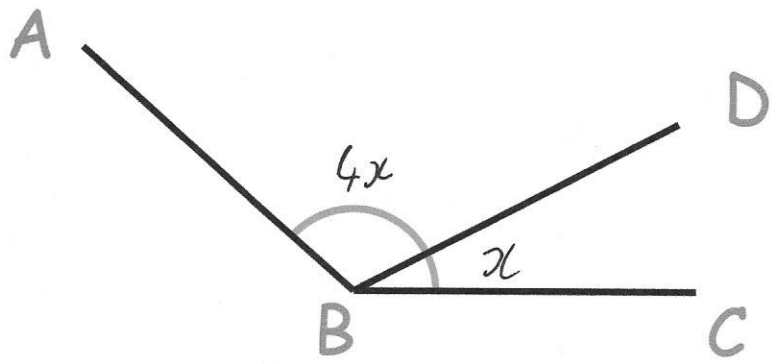
$x = 44$

$5\overline{)220}$ = 44

x = 44 .....°

(4)

8. ABC is an obtuse angle.



Angle ABD is four times larger than angle DBC.

ABC = 160°

Work out the size of angle ABD

$$4x + x = 160$$

$$5x = 160$$

$$x = 32$$

$$5\overline{)160} \quad 032$$

$$32 \times 4 = 128$$

128 °

(3)

9. Shay recorded three songs, A, B and C.

Song B is 40 seconds longer than song A.

Song C is twice as long as song A.

The total length of the three songs is 680 seconds.

Work out the length of song B.
Give your answer in minutes and seconds.

Let Song A = x

Song B = $x + 40$

Song C = $2x$

$4x + 40 = 680$

$-40 \quad -40$

$4x = 640$

$\div 4 \quad \div 4$

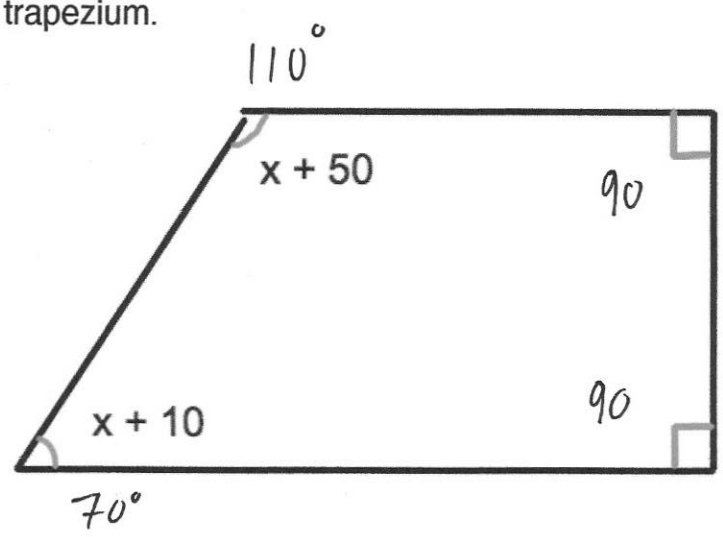
$x = 160$

Song B : $160 + 40 = 200$ seconds

3 .....minutes 20 .....seconds

(4)

10. Shown is a trapezium.



Calculate the size of the largest angle in the trapezium.

$2x + 240 = 360$

$-240 \quad -240$

$2x = 120$

$\div 2 \quad \div 2$

$x = 60$

$x =$ 110 °

(4)

11. In a bag, there are green, yellow and blue sweets.

There are three times as many yellow sweets than blue sweets.
There are 8 less blue sweets than green sweets.

Altogether there are 128 sweets in the bag.

Work out the ratio of green sweets to blue sweets in the bag.

Let x be the number of blue sweets

$3x$ be the number of yellow sweets.

$x+8$ be the number of green sweets.

$5x + 8 = 128$

$-8 \quad -8$

$5x = 120$

$\div 5 \quad \div 5$

$x = 24$

$32 : 24$

$\div 8$ ($2 \div 8$

$4 : 3$

24 blue sweets

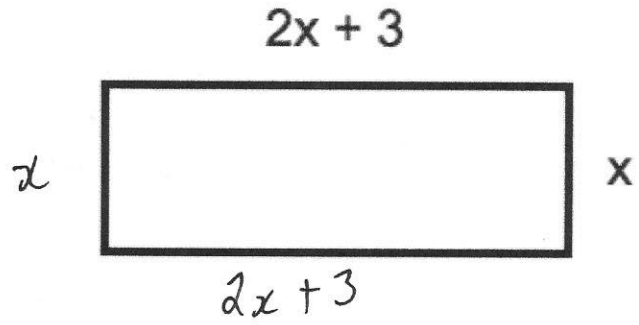
32 green sweets

4 : 3

.....

(5)

12. Below is a rectangle, with width x cm and length 2x + 3 cm.



The perimeter of the rectangle is 72cm.

Calculate the size of the width and length.

$6x + 6 = 72$

$-6 \quad -6$

$6x = 66$

$\div 6 \quad \div 6$

$x = 11$

$2 \times 11 = 22$

$22 + 3 = 25$

Width = 11 cm

Length = 25 cm

(4)

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13. The cost of a chair is £ x

A table costs £15 more than a chair. $x + 15$

The total cost of a chair and a table is £335.

Find the cost of a table.

$x + (x + 15) = 335$

$2x + 15 = 335$

$-15 \quad -15$

$2x = 320$

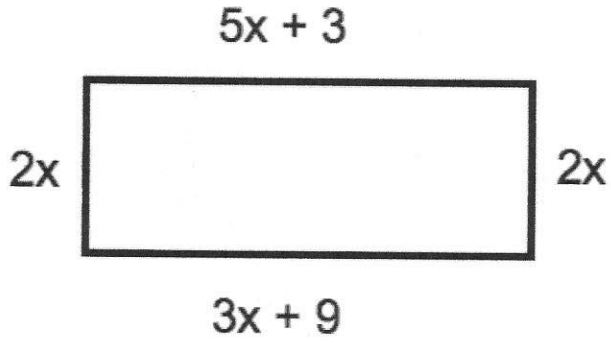
$\div 2 \quad \div 2$

$x = 160$

£ 175

(3)

14.



The diagram shows a rectangle. The sides are measured in centimetres.

(a) Explain why $5x + 3 = 3x + 9$

The opposite sides of a rectangle are the same length, so $5x + 3 = 3x + 9$

(1)

(b) Solve $5x + 3 = 3x + 9$

$-3x \quad -3x$

$2x + 3 = 9$

$-3 \quad -3$

$2x = 6$

$\div 2 \quad \div 2$

$x = 3$

x = 3 cm

(2)

(c) Calculate the perimeter of the rectangle.

$5 \times 3 + 3 = 18$

$2 \times 3 = 6$

$18 + 18 + 6 + 6 = 48$

48 cm

(2)

15. Jolene buys 14 sandwiches and 9 drinks for £91 9100p
A sandwich costs 75p more than a drink.

Find the cost of a drink.

let x be the cost of a drink

$x + 75$ is the cost of a sandwich

$14(x + 75) + 9x = 9100$ $x = 350$

$14x + 1050 + 9x = 9100$

$23x + 1050 = 9100$

$-1050 \quad -1050$

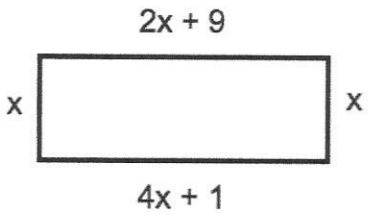
$23x = 8050$

$\div 23 \quad \div 23$

£ 3.50

(4)

16. A rectangle is shown below.



(a) Explain why $4x + 1 = 2x + 9$

The opposite sides of a rectangle are the same length.

(1)

(b) Find the size of x.

$4x + 1 = 2x + 9$

$-2x \quad -2x$

$2x + 1 = 9$

$-1 \quad -1$

$2x = 8$

$x = 4$

x = 4 cm

(2)

(c) Work out the area of the rectangle.

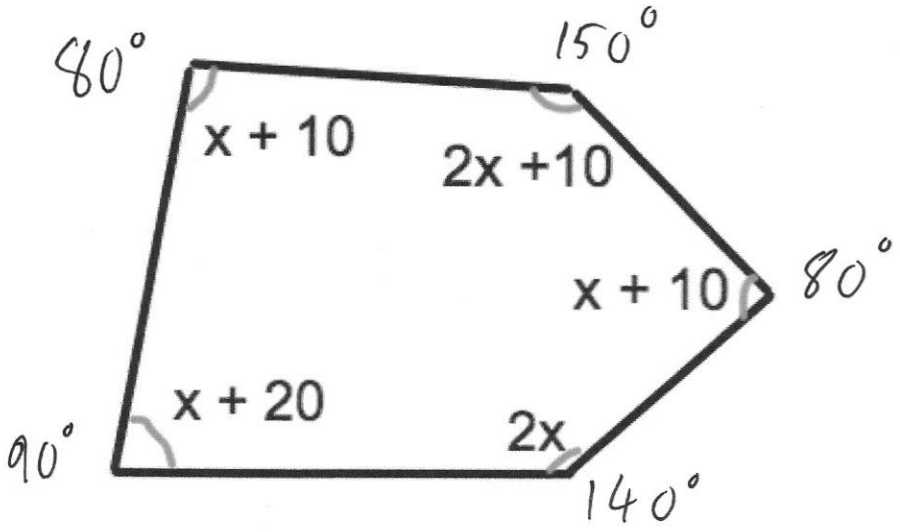
$4 \times 4 + 1 = 17$

$17 \times 4 = 68$

68 cm^2

(2)

17. Shown is a pentagon, with the size of each angle shown.



Find the size of the largest angle.

$7x + 50 = 540$

$-50 \quad -50$

$7x = 490$

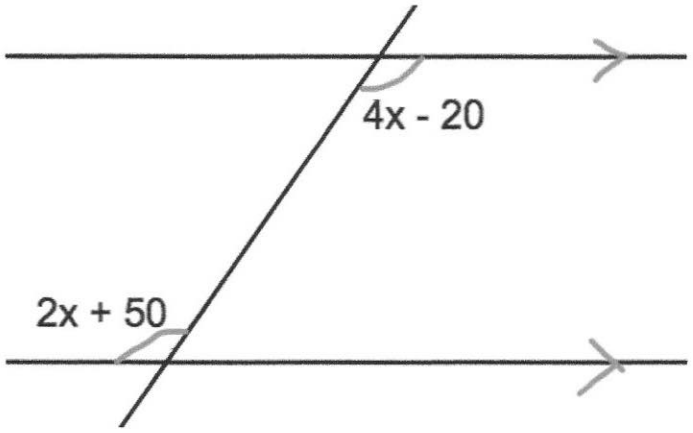
$\div 7 \quad \div 7$

$x = 70$

150 .....°

(4)

18. The diagram below shows a pair of parallel lines.



Calculate the size of the angle, 2x + 50.

$4x - 20 = 2x + 50$

$-2x \quad -2x$

$2x - 20 = 50$

$+20 \quad +20$

$2x = 70$

$\div 2 \quad \div 2$

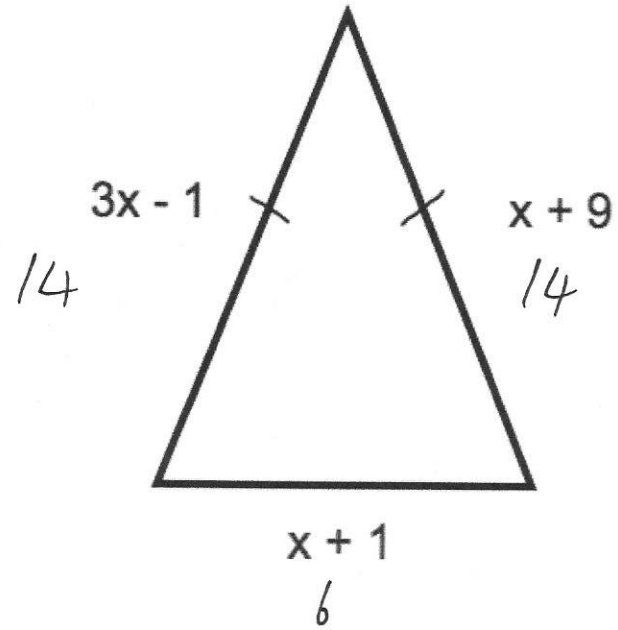
$x = 35$

$2 \times 35 + 50 = 120$

120 ..... °

(4)

19. Shown below is an isosceles triangle. Each side is measured in centimetres.



(a) Explain why $3x - 1 = x + 9$

As the triangle is isosceles, the two sides that are marked as equal, are equal, so $3x - 1 = x + 9$

(1)

(b) Solve the equation above.

$3x - 1 = x + 9$

$-x \quad -x$

$2x - 1 = 9$

$+1 \quad +1$

$2x = 10$

$x = 5$

x = 5 cm

(2)

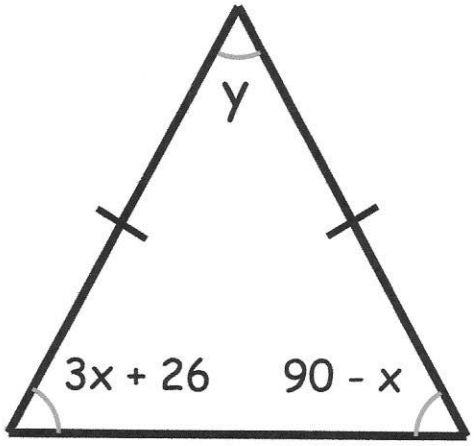
(c) Calculate the perimeter of the triangle.

$14 + 14 + 6 = 34$

34 cm

(2)

20.



Work out the size of angle y.

$3x + 26 = 90 - x$

$+x \qquad +x$

$4x + 26 = 90$

$-26 \quad -26$

$4x = 64$

$\div 4 \quad \div 4$

$x = 16$

$90 - 16 = 74$

$3x + 26 = 74$

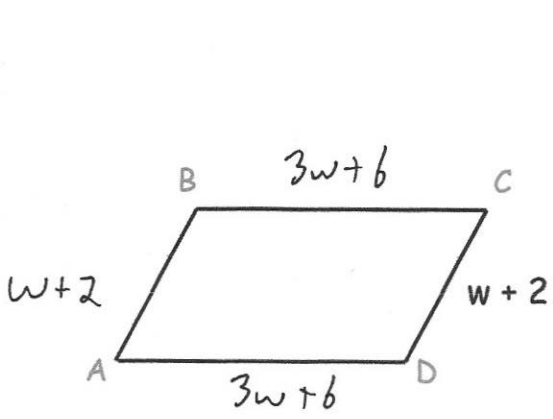
$+ \quad 148$

$180 - 148 = 32$

32 .....°

(4)

21. ABCD is a parallelogram and EFG is an isosceles triangle.



CD = $w + 2$ cm EF = $3w + 9$ cm FG = $8w - 3$ cm

BC = 3AB

The perimeter of the parallelogram is equal to the perimeter of the triangle.

Calculate the length of EG.

$AB = w + 2$

$BC = 3w + 6$

$3w + 9 = 8w - 3$

$-3w \quad -3w$

$9 = 5w - 3$

$+3 \quad +3$

$12 = 5w$

$\div 5 \quad \div 5$

$w = 2.4$

Parallelogram:

$(w+2) + (w+2) + (3w+6) + (3w+6)$

$= 8w + 16$

$8 \times 2.4 + 16 = 35.2$cm

triangle:

$3 \times 2.4 + 9 = 16.2$

$16.2 + 16.2 = 32.4$

$35.2 - 32.4 =$

2.8 .....cm

(5)

22. On Monday, Desmond ran x kilometres.

On Tuesday, he ran three kilometres less than Monday. $x - 3$

On Wednesday, Desmond ran four times the distance he ran on Monday. $4x$

The mean distance ran was 16 kilometres.

Work out how far Desmond ran on Wednesday

$$\frac{x + (x-3) + 4x}{3} = 16$$

$$\frac{6x - 3}{3} = 16$$

$$6x - 3 = 48$$

$$6x = 51$$

$$x = 8.5$$

$4 \times 8.5 = 34$

34 .....km

(5)