

Answer Key To Extended Answer

1

Work : (example)

Let x be the amount of money Matthew collected

$$x + \frac{x}{4} + 97.35 = 300.00$$

$$\frac{5x}{4} = 202.65$$

$$x = 162.12 \text{ (Matthew)}$$

$$40.53 \text{ (Philip)}$$

Result Matthew collected \$162.12.

Philip collected \$40.53.

2

Work : (example)

Let x represent my money

Mathematize the situation

$$5x + 3 = 6x - 18$$

Solve the equation

$$6x - 5x = 18 + 3$$

$$x = 21$$

Result \$21

3

Work : (example)

Let x be one of the numbers

$2x$ be double the first number

Mathematize the situation

$$x + 2x = -21$$

Solve the equation

$$3x = -21$$

$$x = -7$$

Result The two numbers are -7 and -14.

4

Work : (example)

Let x be one of the numbers

$x - 5$ be the other number

Mathematize the situation

$$x + x - 5 = 29$$

Solve the equation

$$2x - 5 = 29$$

$$2x = 34$$

$$x = 17$$

$$x - 5 = 12$$

Result The two numbers are 12 and 17.

5

Work : (example)

Let x be Benjamin's age

$x + 5$ be the age of the middle brother

$x + 10$ be the age of the oldest brother

Mathematize the situation

$$x + x + 5 + x + 10 = 90$$

Solve the equation

$$3x + 15 = 90$$

$$3x = 75$$

$$x = 25$$

Result Benjamin is 25 years old.

6

Work : (example)

Let x be the price of a pair of skis

$3x$ be the price of the bicycle

Mathematize the situation

$$x + 3x = 540$$

Solve the equation

$$4x = 540$$

$$x = 135$$

Price of the bicycle

$$135 \times 3 = 405$$

Result The price of the bicycle is \$405.

7

Work : (example)

Let x be the number

Equation

$$3x - 70 = 113$$

Solution

$$3x = 183$$

$$x = 61$$

Result The number is 61.

8

Work : (example)

Let x , Friday's tips

$2x$, Saturday's tips

$2x - 30$, Sunday's tips

Equation

$$x + 2x + 2x - 30 = 350$$

$$5x = 380$$

$$x = 76$$

Result The waiter made \$76 on Friday, \$152 on Saturday and \$122 on Sunday.

9

Work : (example)

Let x , number of goals Paul scored

$$6 + x - 3 + x = 25$$

$$2x + 3 = 25$$

$$2x = 22$$

$$\frac{2x}{2} = \frac{22}{2}$$

$$x = 11$$

Result Paul scored 11 goals.

10

Work : (example)

Let x represent the number of Secondary 1 students

$3x$ represent the number of Secondary 2 students

$6x$ represent the number of Secondary 3 students

Equation

$$x + 3x + 6x = 430$$

$$10x = 430$$

$$x = 43$$

Number of Secondary 2 students

$$3 \times 43 = 129$$

Result 129 Secondary 2 students participated.

11 Work : (example)

Let x : number of receipts

$$2\left(\frac{x}{2}\right) + 200 \times 5 + 10\left(x - 200 - \frac{x}{2}\right) = 6200$$

$$x + 1000 + 5x - 2000 = 6200$$

$$6x - 1000 = 6200$$

$$6x = 7200$$

$$x = \frac{7200}{6} = 1200$$

Result 1200 receipts.

12 Work : (example)

Student's age : x

Teacher's age : $4x$

Equation

$$3(x + 5) = (4x + 5)$$

$$3x + 15 = 4x + 5$$

$$10 = x$$

Result The student is 10 years old.

13

Work : (example)

Equation

$$x + 4 + 2x - 1 + 3x - 7 = 44$$

$$6x - 4 = 44$$

$$6x = 48$$

$$x = 8$$

Length of the three sides

$$x + 4 = 8 + 4 = 12$$

$$2x - 1 = 16 - 1 = 15$$

$$3x - 7 = 24 - 7 = 17$$

Result The length of the sides of the triangle are 12 cm, 15 cm and 17 cm.

14

Work : (example)

1st person $\rightarrow x$ 2nd person $\rightarrow 2x$ 3rd person $\rightarrow 2x - 2$

$$(x) + (2x) + (2x - 2) = 78$$

$$5x - 2 = 78$$

$$5x = 80$$

$$x = 16$$

Result 16 years, 32 years and 30 years

15

Work : (example)

Let x : number of newspapers delivered by Cathy $x + 50$: number of newspapers delivered by Kelly

$$(x \times 0.10) + [(x + 50) \times 0.10] = 25$$

$$0.1x + 0.1x + 5 = 25$$

$$0.2x = 20$$

$$x = 100$$

As Cathy delivered 100 newspapers at \$0.10 each

$$100 \times \$0.10 = \$10.$$

Result Cathy received \$10.

16

Work : (example)

Let x = number of compact disks sold in France

$$26\,000 + x + x + 8000 = 52\,000$$

$$2x = 18\,000$$

$$x = 9000$$

Number of compact disks he must sell in other francophone countries to meet his goal

$$x + 8000 = 9000 + 8000 = 17\,000$$

Result 17 000 compact disks

17 Work : (example)

Let x be the winning number

Four fifths on the number : $\frac{4}{5}x$

Triple the number : $3x$

$$\frac{4}{5}x + 3x = 1140$$

$$4x + 15x = 5700$$

$$19x = 5700$$

$$x = 300$$

Result The winning number is 300.

18 Work : (example)

Let x , represent the number of screws

$4x + 12$, the number of nails

$x + 5$, the number of pieces of wood

$$x + 4x + 12 + x + 5 = 59$$

$$6x = 42$$

$$x = 7$$

Result 7 screws, 40 nails and 12 pieces of wood are needed to build the bird house.

19

Work : (example)

Find the value of x

$$2(2x - 1) + 2(3x + 3) = 24$$

$$4x - 2 + 6x + 6 = 24$$

$$10x = 20$$

$$x = 2$$

Find the floor dimensions

$$\text{width : } 2x - 1$$

$$2 \times 2 - 1 = 3$$

$$\text{length : } 3x + 3$$

$$3 \times 2 + 3 = 9$$

Find the area of the floor

$$\text{Area} = \text{width} \times \text{length}$$

$$\text{Area} = 3 \times 9$$

$$\text{Area} = 27$$

Result The area of floor to be covered is 27 m².

20

Work : (example)

Perimeter

$$2(x + (2x - 3)) = 26.16$$

$$x + (2x - 3) = 13.08$$

$$3x - 3 = 13.08$$

$$3x = 16.08$$

$$x = 5.36$$

Width : 5.36 m

Length : $2(5.36) - 3 = 7.72$ m

Result The dimensions are : 5.36 m and 7.72 m.

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Example of an appropriate method

Given x : number of watts consumed by a blender
 $5x$: number of watts consumed by a hair dryer
 $5x - 100$: number of watts consumed by a curling iron

Mathematize the situation

$$x + 5x + 5x - 100 = 2100$$

Solve the equation

$$11x - 100 = 2100$$

$$11x = 2200$$

$$x = 200$$

$$5x = 1000$$

$$5x - 100 = 900$$

Answer The blender consumes 200 watts of energy, the hair dryer consumes 1000 watts of energy, and the curling iron consumes 900 watts of energy.

22

Let x , the number of books Victor read
 $3x$, the number of books Austin read
 $3x - 4$, the number of books Jena read

Mathematization

$$3x + x + 3x - 4 = 31$$

Solution of equation

$$7x - 4 = 31$$

$$7x = 35$$

$$x = 5$$

Answer Victor has read 5 books.
 Austin has read 15 books.
 Jena has read 11 books.

23

Example of an appropriate solution

Dimensions of field (Rectangle B)

$$3(2x + 1) = 6x + 3$$

$$3(x) = 3x$$

Perimeter of enclosure (Rectangle A)

$$2(2x + 1) + 2(x) = 4x + 2 + 2x$$

$$= 6x + 2$$

Perimeter of field (Rectangle B)

$$2(6x + 3) + 2(3x) = 12x + 6 + 6x$$

$$= 18x + 6$$

Length of the fence

$$6x + 2 + 18x + 6 = 248$$

$$24x + 8 = 248$$

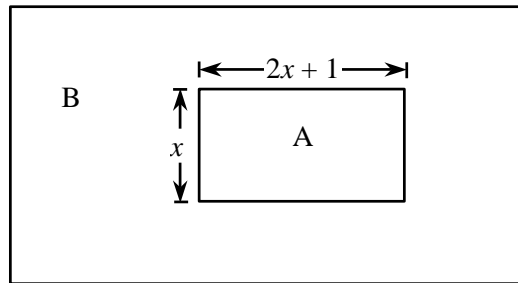
$$24x = 240$$

$$x = 10$$

Perimeter of the horses' enclosure (Rectangle A)

$$6(10) + 2 = 62$$

Answer The actual perimeter of the horses' enclosure is 62 m.



Example of an appropriate solution

Given x : the age of the child

$5x$: the age of the father

$5x - 3$: the age of the mother

74: the sum of the ages

Equation

$$x + 5x + 5x - 3 = 74$$

Solving the equation

$$x + 5x + 5x - 3 = 74$$

$$11x - 3 = 74$$

$$11x = 77$$

$$x = 7$$

The age of the child: 7

The age of the father: $5 \times 7 = 35$

The age of the mother: $5 \times 7 - 3 = 32$

Answer The father is **35** years old.

The mother is **32** years old

The child is **7** years old.

25 Example of an appropriate solution

Let x be the amount (\$) Stephanie contributed
 $2x$ be the amount (\$) Ed contributed
 $3x + 10$ be the amount (\$) Caroline contributed

$$(3x + 10) + 2x + x = 310$$

$$6x + 10 = 310$$

$$6x = 300$$

$$x = 50$$

Answer: Stephanie contributed \$50.
Ed contributed \$100.
Caroline contributed \$160.

26 Example of an appropriate solution

Let w be the width of the cover in cm
 $2w - 4$ be the length of the cover in cm

$$2[w + (2w - 4)] = 166$$

$$6w - 8 = 166$$

$$6w = 174$$

$$w = 29$$

Width is 29 cm, length is 54 cm

Area is $29 \times 54 = 1566$

Answer: The area of the cover is 1566 cm^2 .

27

Example of an appropriate solution

Area of triangle

$$\frac{10(2x + 4)}{2} = (10x + 20)$$

Base of rectangle

$$2(2x + 4) = (4x + 8)$$

Area of rectangle

$$10(4x + 8) = (40x + 80)$$

Combined area

$$(10x + 20) + (40x + 80) = 300$$

$$50x + 100 = 300$$

$$50x = 200$$

$$x = 4$$

Perimeter of rectangle

$$2(10) + 2(4x + 8) = 8x + 36$$

Substituting value of 4

Perimeter

$$8(4) + 36 = 68$$

Answer: The perimeter of the rectangle is **68 cm**.

Example of appropriate solutions

28

Example 1Using ratio of areas, find value of y

$$\frac{3}{8} = \frac{5y - 7}{44}$$

$$8(5y - 7) = 132$$

$$40y - 56 = 132$$

$$40y = 188$$

$$y = 4.7$$

Answer: The value of y is **4.7**.**Example 2**

$$\frac{1}{8} \text{ of area} = 44 \div 8 = 5.5$$

$$\frac{3}{8} \text{ of area} = 5.5 \times 3 = 16.5$$

$$\text{Value of } y: 5y - 7 = 16.5$$

$$5y = 23.5$$

$$y = 4.7$$

29

Example of an appropriate solution

Area of the rectangle

$$18(3x + 2) = 144$$

$$54x + 36 = 144$$

$$54x = 108$$

$$x = 2$$

Height of triangle

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

$$= 8$$

Area of triangle

$$\frac{144}{3} = 48$$

$$8 \times \frac{\text{base}}{2} = 48$$

$$8 \text{ base} = 96$$

$$\text{base} = 12$$

Answer: The base of the shaded triangle measures **12 cm**.

30

Example of an appropriate solution

Let x , be the amount of money Lucy has
 $x - 5$, amount of money Jennifer has
 $2(x - 5)$, amount of money Silvia has

Mathematization

$$x + x - 5 + 2(x - 5) = 65$$

Solve the equation

$$4x - 15 = 65$$

$$4x = 80$$

$$x = 20$$

Answer Lucy has \$20.

Jennifer has \$15.

Silvia has \$30.

31

Work : (example)

Gonzo's age : $3x - 6$

Touta's age : $3x - 6 + x + 2 = 4x - 4$

Kali's age : $3x - 6 - x - 4 = 2x - 10$

Sum of their ages

$$3x - 6 + 4x - 4 + 2x - 10 = 205$$

Value of x

$$9x - 20 = 205$$

$$9x = 225$$

$$x = 25$$

Age of the guards

$$\text{Gonzo : } 3(25) - 6 = 69$$

$$\text{Touta : } 4(25) - 4 = 96$$

$$\text{Kali : } 2(25) - 10 = 40$$

Result The oldest of the 3 guards is 96 years old.

32

Work : (example)

Perimeter

$$a + 2a + a + a + a + 3a + 3a + 4a = 56$$

$$16a = 56$$

Solution

$$16a = 56$$

$$a = \frac{56}{16}$$

$$a = 3.5$$

Result The variable a represents 3.5 m.

33

Work : (example)

Let x be the maximum number of marks per question

Mathematize the situation

$$6x + \frac{4x}{4} + \frac{2x}{3} + \frac{x}{2} + 0 = 49$$

Solve the equation

$$6x + x + \frac{2x}{3} + \frac{x}{2} = 49$$

$$\left(6 + 1 + \frac{2}{3} + \frac{1}{2}\right)x = 49$$

$$\left(\frac{36 + 6 + 4 + 3}{6}\right)x = 49$$

$$\frac{49x}{6} = 49$$

$$x = \frac{49 \times 6}{49} = 6$$

Result Each question was worth 6 marks.

Work : (example)

x , represents the numbers of volunteers in the 1st group.

$x + 20$, represents the number of volunteers in the 2nd group.

$2x$, represents the number of volunteers in the 3rd group.

Number of cans collected by the 1st group : $2x$

Number of cans collected by the 2nd group : $3(x + 20)$

Number of cans collected by the 3rd group : $6(2x)$

Total number of cans collected

$$2x + 3(x + 20) + 6(2x) = 740$$

$$2x + 3x + 60 + 12x = 740$$

$$17x = 680$$

$$x = 40$$

Number of volunteers per group

1st group : 40

2nd group : $40 + 20 = 60$

3rd group : $2 \times 40 = 80$

Total number of volunteers

$$40 + 60 + 80 = 180$$

Result 180 volunteers participated in this food drive.

35

Work : (example)

Let x , mark on 1st test

$2x - 36$, mark on 2nd test

$\frac{3}{4}(2x - 36)$, mark on 3rd test

$$x + 2x - 36 + \frac{3}{4}(2x - 36) = 216$$

$$x - 63 = 216$$

$$x = 62$$

Result David's mark on the first test was 62 %.

36

Example of an appropriate procedure

The student solved the problem by writing the correct equation and solving it.

Answer 3 bananas, 6 apples and 12 oranges were used to make this salad.

37 Example of an appropriate solution

Let x , be the cost of the soap
 $x + 15$, the cost of the body cream
 $2(x + 15)$, the cost of the perfume

Equation

$$x + (x + 15) + 2(x + 15) = 72$$

Solution

$$4x + 45 = 72$$

$$4x = 27$$

$$x = 6.75$$

Cost of the perfume

$$2(6.75 + 15) = 43.50$$

Answer The cost of the perfume is \$43.50.

38 Example of an appropriate method

Let x be the number of roses
 $x - 5$, the number of carnations
 $3(x - 5)$, the number of daisies

Equation representing the situation

$$x + x - 5 + 3(x - 5) = 30$$

Solving the equation

$$x + x - 5 + 3x - 15 = 30$$

$$5x - 20 = 30$$

$$5x = 50$$

$$x = 10$$

Answer: There are 5 carnations, 10 roses and 15 daisies in Kristin's bouquet.

39

Example of an appropriate solution

Let x : width $3x + 5$: length

$$2(3x + 5 + x) = 314$$

$$6x + 10 + 2x = 314$$

$$8x + 10 = 314$$

$$8x = 304$$

$$x = 38$$

Width: $x = 38$ mLength: $3x + 5 = 3 \times 38 + 5 = 119$ m

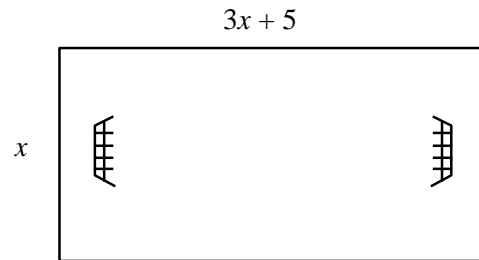
Area of the rectangular field

$$A = w \times L$$

$$\text{Area: } 38 \text{ m} \times 119 \text{ m} = 4522 \text{ m}^2$$

Cost of the sod

$$4522 \text{ m}^2 \times \$1.50/\text{m}^2 = \$6783$$

Answer It will cost **\$6783** to cover the field with sod.

40

Example of an appropriate solution

Given x : number of children's T-shirts

$(24 - x)$: number of adult T-shirts

Equation

$$3x + 5(24 - x) = 110$$

$$3x + 120 - 5x = 110$$

$$3x - 5x = 110 - 120$$

$$-2x = -10$$

$$x = 5$$

$$24 - x = 19$$

Answer: Nicolas sold **5** children's T-shirts and **19** adult T-shirts.