



Worked solutions: Expand a single bracket

M-ALG-007-WS01-R01

42

6 groups of 7 make 42.

M-ALG-007-WS01-R02

-12

Positive $\times$ negative is negative; $4 \times 3 = 12$.

M-ALG-007-WS01-R03

7x

Add the coefficients: $4 + 3 = 7$.

M-ALG-007-WS01-R04

7y

Subtract the coefficients: $9 - 2 = 7$.

M-ALG-007-WS01-F01

$2x + 10$

Multiply both terms by 2: $2 \times 1x$ and $2 \times (5)$.

Simplify to $2x + 10$.

M-ALG-007-WS01-F02

$3x + 18$

Multiply both terms by 3: $3 \times 1x$ and $3 \times (6)$.

Simplify to $3x + 18$.

M-ALG-007-WS01-F03

$4x + 8$

Multiply both terms by 4: $4 \times 1x$ and $4 \times (2)$.

Simplify to $4x + 8$.

M-ALG-007-WS01-F04

$5x + 15$

Multiply both terms by 5: $5 \times 1x$ and $5 \times (3)$.

Simplify to $5x + 15$.



Worked solutions: continued

M-ALG-007-WS01-F05

$$6x + 24$$

Multiply both terms by 6: $6 \times 1x$ and $6 \times (4)$.

Simplify to $6x + 24$.

M-ALG-007-WS01-F06

$$7x + 14$$

Multiply both terms by 7: $7 \times 1x$ and $7 \times (2)$.

Simplify to $7x + 14$.

M-ALG-007-WS01-F07

$$6x + 12$$

Multiply both terms by 3: $3 \times 2x$ and $3 \times (4)$.

Simplify to $6x + 12$.

M-ALG-007-WS01-F08

$$12x + 8$$

Multiply both terms by 4: $4 \times 3x$ and $4 \times (2)$.

Simplify to $12x + 8$.

M-ALG-007-WS01-F09

$$10x + 14$$

Multiply both terms by 2: $2 \times 5x$ and $2 \times (7)$.

Simplify to $10x + 14$.

M-ALG-007-WS01-F10

$$5x - 10$$

Multiply both terms by 5: $5 \times 1x$ and $5 \times (-2)$.

Simplify to $5x - 10$.

M-ALG-007-WS01-F11

$$6x - 15$$

Multiply both terms by 3: $3 \times 2x$ and $3 \times (-5)$.

Simplify to $6x - 15$.



Worked solutions: continued

M-ALG-007-WS01-F12

$$12x - 8$$

Multiply both terms by 4: $4 \times 3x$ and $4 \times (-2)$.

Simplify to $12x - 8$.

M-ALG-007-WS01-D01

$$-2x - 10$$

Multiply both terms by -2: $-2 \times 1x$ and $-2 \times (5)$.

Simplify to $-2x - 10$.

M-ALG-007-WS01-D02

$$-6x + 12$$

Multiply both terms by -3: $-3 \times 2x$ and $-3 \times (-4)$.

Simplify to $-6x + 12$.

M-ALG-007-WS01-D03

$$4x - 12$$

Multiply both terms by 4: $4 \times 1x$ and $4 \times (-3)$.

Simplify to $4x - 12$.

M-ALG-007-WS01-D04

$$-10x + 5$$

Multiply both terms by -5: $-5 \times 2x$ and $-5 \times (-1)$.

Simplify to $-10x + 5$.

M-ALG-007-WS01-A01

$$(5x + 15) \text{ cm}^2$$

Area = length $\times$ width = $5(x + 3)$.

Multiply both terms by 5: area = $(5x + 15) \text{ cm}^2$.

M-ALG-007-WS01-A02

$$£(6x + 12)$$

Total = $3(2x + 4)$.

The 4 must also be multiplied by 3. The total is $£(6x + 12)$.



Worked solutions: continued

M-ALG-007-WS01-H01

$$2x + 12$$

Multiply both terms by 2: $2 \times 1x$ and $2 \times (6)$.

Simplify to $2x + 12$.

M-ALG-007-WS01-H02

$$3x + 15$$

Multiply both terms by 3: $3 \times 1x$ and $3 \times (5)$.

Simplify to $3x + 15$.

M-ALG-007-WS01-H03

$$4x + 12$$

Multiply both terms by 4: $4 \times 1x$ and $4 \times (3)$.

Simplify to $4x + 12$.

M-ALG-007-WS01-H04

$$6x + 12$$

Multiply both terms by 6: $6 \times 1x$ and $6 \times (2)$.

Simplify to $6x + 12$.

M-ALG-007-WS01-H05

$$6x + 10$$

Multiply both terms by 2: $2 \times 3x$ and $2 \times (5)$.

Simplify to $6x + 10$.

M-ALG-007-WS01-H06

$$12x + 6$$

Multiply both terms by 3: $3 \times 4x$ and $3 \times (2)$.

Simplify to $12x + 6$.

M-ALG-007-WS01-H07

$$5x - 15$$

Multiply both terms by 5: $5 \times 1x$ and $5 \times (-3)$.

Simplify to $5x - 15$.



Worked solutions: continued

M-ALG-007-WS01-H08

$$6x - 8$$

Multiply both terms by 2: $2 \times 3x$ and $2 \times (-4)$.

Simplify to $6x - 8$.

M-ALG-007-WS01-H09

$$-2x - 12$$

Multiply both terms by -2: $-2 \times 1x$ and $-2 \times (6)$.

Simplify to $-2x - 12$.

M-ALG-007-WS01-H10

$$-6x + 15$$

Multiply both terms by -3: $-3 \times 2x$ and $-3 \times (-5)$.

Simplify to $-6x + 15$.

M-ALG-007-WS01-H11

$$(6x + 15) \text{ m}^2$$

Area = $3(2x + 5)$.

Multiply both terms by 3: area = $(6x + 15) \text{ m}^2$.

M-ALG-007-WS01-H12

$$12x + 22$$

Total before removing pencils = $6(2x + 5) = 12x + 30$.

Subtract 8: $12x + 30 - 8 = 12x + 22$.



Worked solutions: Add and subtract integers

M-NUM-004-WS01-R01

5

Count back 4 from 9.

M-NUM-004-WS01-R02

$-7, -3, 0, 4$

Numbers further left on a number line are smaller.

M-NUM-004-WS01-R03

-3

Move one step left from -2 .

M-NUM-004-WS01-R04

5

Count from -2 up to 3: five steps.

M-NUM-004-WS01-F01

4

Start at -2 . Move 6 steps right.

The result is 4.

M-NUM-004-WS01-F02

4

Start at -5 . Move 9 steps right.

The result is 4.

M-NUM-004-WS01-F03

-4

Start at -7 . Move 3 steps right.

The result is -4 .

M-NUM-004-WS01-F04

-3

Start at 4. Move 7 steps left.

The result is -3 .



Worked solutions: continued

M-NUM-004-WS01-F05

−6

Start at 2. Move 8 steps left.

The result is -6.

M-NUM-004-WS01-F06

−7

Start at −3. Move 4 steps left.

The result is -7.

M-NUM-004-WS01-F07

4

Start at 6. Move 2 steps left.

The result is 4.

M-NUM-004-WS01-F08

−5

Start at 3. Move 8 steps left.

The result is -5.

M-NUM-004-WS01-F09

−7

Start at −4. Move 3 steps left.

The result is -7.

M-NUM-004-WS01-F10

7

Start at 2. Move 5 steps right.

The result is 7.

M-NUM-004-WS01-F11

−2

Start at −6. Move 4 steps right.

The result is -2.



Worked solutions: continued

M-NUM-004-WS01-F12

5

Start at -3 . Move 8 steps right.

The result is 5.

M-NUM-004-WS01-D01

-3

$$-5 + 8 = 3.$$

$$3 - 6 = -3.$$

M-NUM-004-WS01-D02

4

$$7 - (-2) = 7 + 2 = 9.$$

$$9 + (-5) = 9 - 5 = 4.$$

M-NUM-004-WS01-D03

7

The change from -4 to 3 is 7 steps right.

M-NUM-004-WS01-D04

2

Subtracting a negative is equivalent to adding a positive.

$$-3 - (-5) = -3 + 5 = 2.$$

M-NUM-004-WS01-A01

2°C

$$-4 + 9 = 5.$$

$$5 - 3 = 2, \text{ so the final temperature is } 2^{\circ}\text{C}.$$

M-NUM-004-WS01-A02

$-\text{£}7$

$$-12 + 20 = 8.$$

$$8 - 15 = -7, \text{ so the balance is } -\text{£}7.$$



Worked solutions: continued

M-NUM-004-WS01-H01

3

Start at -4 . Move 7 steps right.

The result is 3.

M-NUM-004-WS01-H02

4

Start at -6 . Move 10 steps right.

The result is 4.

M-NUM-004-WS01-H03

-3

Start at -8 . Move 5 steps right.

The result is -3 .

M-NUM-004-WS01-H04

-4

Start at 5. Move 9 steps left.

The result is -4 .

M-NUM-004-WS01-H05

-7

Start at 3. Move 10 steps left.

The result is -7 .

M-NUM-004-WS01-H06

-8

Start at -2 . Move 6 steps left.

The result is -8 .

M-NUM-004-WS01-H07

3

Start at 7. Move 4 steps left.

The result is 3.



Worked solutions: continued

M-NUM-004-WS01-H08

−7

Start at 2. Move 9 steps left.

The result is -7.

M-NUM-004-WS01-H09

−4

Start at −7. Move 3 steps right.

The result is -4.

M-NUM-004-WS01-H10

4

Start at −5. Move 9 steps right.

The result is 4.

M-NUM-004-WS01-H11

−3°C

$$-6 + 11 = 5.$$

$5 - 8 = -3$, so the final temperature is −3°C.

M-NUM-004-WS01-H12

£5

$$-18 + 25 - 12 = -5.$$

The balance is −£5, so add £5 to reach £0.



Worked solutions: Use the sine rule

M-GEO-051-WS01-R01

AC

The side opposite B joins the other two vertices: A and C.

M-GEO-051-WS01-R02

63°

$$180 - 54 - 63 = 63^\circ.$$

M-GEO-051-WS01-R03

12.8

The first three significant digits are 1, 2, 8. The next digit is 4.

M-GEO-051-WS01-R04

0.643

Use degree mode: $\sin 40^\circ = 0.642787\dots$; round to 0.643.

M-GEO-051-WS01-F01

13.9 cm

$$AC / \sin 72^\circ = 9 / \sin 38^\circ.$$

$$AC = 9 \times \sin 72^\circ / \sin 38^\circ = 13.90294665\dots \text{ cm.}$$

$$AC = 13.9 \text{ cm (3 s.f.)}$$

M-GEO-051-WS01-F02

13.3 cm

$$AC / \sin 61^\circ = 12 / \sin 52^\circ.$$

$$AC = 12 \times \sin 61^\circ / \sin 52^\circ = 13.31890008\dots \text{ cm.}$$

$$AC = 13.3 \text{ cm (3 s.f.)}$$

M-GEO-051-WS01-F03

10 cm

$$AC / \sin 83^\circ = 7 / \sin 44^\circ.$$

$$AC = 7 \times \sin 83^\circ / \sin 44^\circ = 10.00178412\dots \text{ cm.}$$

$$AC = 10 \text{ cm (3 s.f.)}$$



Worked solutions: continued

M-GEO-051-WS01-F04

21.2 cm

$$AC / \sin 96^\circ = 11 / \sin 31^\circ.$$

$$AC = 11 \times \sin 96^\circ / \sin 31^\circ = 21.24064488... \text{ cm.}$$

$$AC = 21.2 \text{ cm (3 s.f.)}$$

M-GEO-051-WS01-D01

46.8°

$$\sin B / 11 = \sin 32^\circ / 8.$$

$$\sin B = 11 \times \sin 32^\circ / 8.$$

$$\text{Inverse sine gives } 46.77241667...^\circ.$$

$$B = 46.8^\circ.$$

M-GEO-051-WS01-D02

133.2°

$$\sin B / 11 = \sin 32^\circ / 8.$$

$$\sin B = 11 \times \sin 32^\circ / 8.$$

$$\text{Inverse sine gives } 46.77241667...^\circ. B \text{ is obtuse, so } B = 180^\circ - 46.77241667...^\circ.$$

$$B = 133.2^\circ.$$

M-GEO-051-WS01-A01a

69°

$$C = 180^\circ - 62^\circ - 49^\circ = 69^\circ.$$

M-GEO-051-WS01-A01b

121 m

$$AC / \sin 49^\circ = 150 / \sin 69^\circ.$$

$$AC = 150 \times \sin 49^\circ / \sin 69^\circ = 121.26050828... \text{ m.}$$

$$AC = 121 \text{ m (3 s.f.)}$$

M-GEO-051-WS01-H01

11.1 cm

$$AC / \sin 66^\circ = 8 / \sin 41^\circ.$$

$$AC = 8 \times \sin 66^\circ / \sin 41^\circ = 11.13979587... \text{ cm.}$$

$$AC = 11.1 \text{ cm (3 s.f.)}$$



Worked solutions: continued

M-GEO-051-WS01-H02

11.5 cm

$$AC / \sin 74^\circ = 10 / \sin 57^\circ.$$

$$AC = 10 \times \sin 74^\circ / \sin 57^\circ = 11.46173161... \text{ cm.}$$

$$AC = 11.5 \text{ cm (3 s.f.)}$$

M-GEO-051-WS01-H03

44.8°

$$\sin B / 9 = \sin 28^\circ / 6.$$

$$\sin B = 9 \times \sin 28^\circ / 6.$$

$$\text{Inverse sine gives } 44.76554211...^\circ.$$

$$B = 44.8^\circ.$$

M-GEO-051-WS01-H04

135.2°

$$\sin B / 9 = \sin 28^\circ / 6.$$

$$\sin B = 9 \times \sin 28^\circ / 6.$$

$$\text{Inverse sine gives } 44.76554211...^\circ. B \text{ is obtuse, so } B = 180^\circ - 44.76554211...^\circ.$$

$$B = 135.2^\circ.$$

M-GEO-051-WS01-H05

62°

$$180 - 37 - 81 = 62^\circ.$$

M-GEO-051-WS01-H06

0.0875

The first significant digit is 8. The fourth significant digit is 6, so round up.

M-GEO-051-WS01-H07

7.11 m

$$\text{Angle C} = 180^\circ - 48^\circ - 67^\circ = 65^\circ.$$

$$AC / \sin 67^\circ = 7 / \sin 65^\circ.$$

$$AC = 7 \times \sin 67^\circ / \sin 65^\circ = 7.10965311... \text{ m.}$$

$$AC = 7.11 \text{ m (3 s.f.)}$$



Worked solutions: continued

M-GEO-051-WS01-H08

188 m; yes, it is shorter than 190 m.

$$\text{Angle C} = 180^\circ - 41^\circ - 73^\circ = 66^\circ.$$

$$AC / \sin 73^\circ = 180 / \sin 66^\circ.$$

$$AC = 180 \times \sin 73^\circ / \sin 66^\circ = 188.42505825... \text{ m.}$$

$$AC = 188 \text{ m (3 s.f.)}.$$

The unrounded length 188.42505825... m is below 190 m.