

Number · Knowledge Test 1

Question 1

1.08, 1.8, 1.808, 1.88. Compare place values by writing 1.8 as 1.800.

Question 2

$416.82 - 23.90 = 392.92$.

Question 3

$204 \div 6 = 34$.

Question 4

$124 \times 3 = 372$.

Question 5

$4.12 \times 2.4 = 9.888$.

Question 6

$3 \times (6 + 9) = 45$.

Question 7

$0.84 \div 0.7 = 8.4 \div 7 = 1.2$.

Question 8

18.764 to 3 significant figures is 18.8.

Question 9

$(7.8 + 5.3) \div (3.6 \times 2.4) = 13.1 \div 8.64 = 655/432 = 1.5162037037\dots$ (1.516 to 3 decimal places).

Question 10

(a) $10 \div 2 \approx 5$ servings. (b) Overestimate: 9.78 was rounded up and 2.04 down.

Question 11

$(-5)(-2)(3) = 30$.

Question 12

Multiples of 4: 4, 8, 12; multiples of 6: 6, 12. Smallest positive common multiple: 12.

Question 13

Square numbers: 1, 16, 25, 36.

Question 14

70.1%, 0.705, 74%, $\frac{3}{4}$, 0.76. These are 0.701, 0.705, 0.74, 0.75, 0.76.

Question 15

$84 = 2^2 \times 3 \times 7$; $210 = 2 \times 3 \times 5 \times 7$. HCF = 42; LCM = 420.

Question 16

(a) $(\frac{3}{2})(\frac{3}{4}) = \frac{9}{8} = 1 \frac{1}{8}$. (b) $(\frac{13}{6}) \div (\frac{4}{3}) = \frac{13}{8} = 1 \frac{5}{8}$.

Question 17

(a) $4 \frac{3}{4}$. (b) $2 \frac{11}{12}$. Convert mixed numbers to improper fractions before operating.

Question 18

6.

Question 19

420.

Question 20

$\frac{10}{9} = 1 \frac{1}{9}$.

Question 21

£85.

Question 22

£5304.50.

Question 23

65% profit.

Question 24

$$5a^7b^4.$$

Question 25

$$4 \times 10^6.$$

Question 26

Rounding to the nearest whole number gives $41.5 \leq m < 42.5$.

Algebra · Knowledge Test 1

Question 1

(a) $3a$. (b) $3b + 2c$. Collect like terms.

Question 2

$2x^2$.

Question 3

$13x - 22$. Expand the brackets, then collect terms.

Question 4

$(4x - 1)(5x - 6) = 20x^2 - 29x + 6$.

Question 5

$6x(x - 2)$.

Question 6

$(x - 2)(x - 3)$.

Question 7

$(x - 10)(x + 10)$.

Question 8

$m = 3(n - 8)$.

Question 9

(a) 24. (b) $v^2 = 64$, so $v = \pm 8$ algebraically; if v is a speed, $v = 8$.

Question 10

$x = 33$.

Question 11

Opposite sides are equal: $3x + 4 = 5x - 8$, so $x = 6$. Dimensions are 22 cm and 12 cm; area = 264 cm^2 .

Question 12

$$x = 6 \text{ or } x = -4.$$

Question 13

Include -2 (filled circle) and shade all values to its left.

Question 14

$$x \leq 13.$$

Question 15

$$x = 2, y = -1.$$

Question 16

$$5n + 7.$$

Ratio and Proportion · Knowledge Test 1

Question 1

55.

Question 2

Offer B: three items cost £3.40, approximately £1.13 each, compared with £1.60 each for offer A.

Question 3

Potatoes 1200 g; carrots 900 g; stock 2250 ml. Scale each ingredient by the same factor.

Question 4

2150 ml.

Question 5

4 hours 30 minutes.

Question 6

Density = mass $\div$ volume = 2.8 g/cm³.

Question 7

Pressure = force $\div$ area = 180 N/m².

Question 8

10 days.

Geometry · Knowledge Test 1

Question 1

$\angle BCD = 70^\circ$; $\angle ACB = 110^\circ$; hence $\angle ABC = 180^\circ - 110^\circ - 35^\circ = 35^\circ$.

Question 2

$360^\circ - 120^\circ - 108^\circ = 132^\circ$.

Question 3

$\angle CED = 180^\circ - 127^\circ - 32^\circ = 21^\circ$; vertically opposite $\angle AEB = 21^\circ$.

Question 4

The line is a tangent: it touches the circle at one point.

Question 5

Draw 5 cm on a bearing of 300° from London. Measure clockwise from north.

Question 6

Using the stated radius 7 cm, $\text{area} = \pi r^2/2 = 49\pi/2 \approx 77.0 \text{ cm}^2$.

Question 7

A and B are congruent by SSS: their three corresponding sides are 5, 7 and 8.

Question 8

Volume = area of triangular cross section $\times$ length = $(3 \times 5 \div 2) \times 9 = 67.5 \text{ cm}^3$.

Question 9

$AD = 22 \div 2 = 11 \text{ cm}$. $CE = \sqrt{(11^2 + 7^2)} = \sqrt{170} \approx 13.0 \text{ cm}$.

Question 10

Surface area = $2(6 \times 4 \div 2) + (6 + 5 + 5) \times 10 = 184 \text{ cm}^2$.

Question 11

Missing side = $\sqrt{(15.6^2 - 9.2^2)} \approx 12.6 \text{ cm}$.

Question 12

$\tan \theta = 20/11$, so $\theta \approx 61.2^\circ$.

Question 13

$\sqrt{3}/2$.

Question 14

On the 1 cm : 100 m scale, draw a 4 cm boundary around the lake and keep points inside it; draw a 2 cm boundary around the footpath and keep points outside it. Draw the perpendicular bisector of A and B and keep the A side. Shade the overlap of all three regions.

Question 15

Rotation 90° clockwise about the origin. Each point (x, y) maps to $(y, -x)$.

Question 16

$a = (-6, 4)$, $b = (-5, 2)$. (a) $2a = (-12, 8)$. (b) $-b = (5, -2)$. (c) $2a + b = (-17, 10)$.

Probability · Knowledge Test 1

Question 1

90.

Question 2

A only: {1, 2, 4}; $A \cap B$: {3, 6, 12}; B only: {9}; neither: {5, 7, 8, 10, 11}. $P(A \cap B) = 3/12 = 1/4$.

Question 3

Each coin branch has probability $1/2$. Outcomes HH, HT, TH, TT each have probability $1/4$; exactly one head = $1/2$.

Question 4

Films: 42; nonfilms: 18. Films and TV: 30, films and no TV: 12; nonfilms and TV: 12, nonfilms and no TV: 6.
 $P(\text{films}) = P(\text{TV}) = 42/60 = 7/10$.

Question 5

Members: cash 30, card 30, mobile 30. Nonmembers: cash 10, card 40, mobile 20. Column totals: cash 40, card 70, mobile 50.

Question 6

Twelve outcomes: H1, H2, H3, H4, H5, H6, T1, T2, T3, T4, T5, T6.

Statistics · Knowledge Test 1

Question 1

Three errors: May is drawn at 5 instead of 6; adjacent bars touch; vertical axis needs a "Frequency" label.

Question 2

Use class midpoints 5, 15, 25, 35, 45 on the horizontal axis; plot the corresponding frequencies and join consecutive points with straight lines.

Question 3

One square represents 40 cartons. Skimmed = 150, semi-skimmed = 80, whole = 120, other = 50 ($1\frac{1}{4}$ symbols). Fraction whole = $120/400 = 3/10$.

Question 4

Sector angles: dog 144° , cat 108° , rabbit 72° , fish 36° ; total 360° .

Question 5

Positive correlation. For height 165 cm, estimate an arm span of about 165 cm from the line of best fit.

Question 6

Mode = 41; median = 43; range = 31.

Question 7

Estimated mean = $(5 \times 4 + 15 \times 7 + 25 \times 5 + 35 \times 4)/20 = 19.5$. Modal and median class: $10 < a \leq 20$.

Question 8

The other four values sum to $60 - 20 = 40$; one valid set is 10, 10, 10, 10.

Question 9

Total for six = $6 \times 15 = 90$; first five total = $5 \times 14 = 70$; sixth = 20.

Graphs · Knowledge Test 1

Question 1

$A = (1, -4)$, $B = (3, 2)$. Midpoint = $((1+3)/2, (-4+2)/2) = (2, -1)$. $C = (-1, 5)$.

Question 2

For $x = -4, -3, -2, -1, 0, 1$, $y = -2x + 1$ gives 9, 7, 5, 3, 1, -1. Plot and join with a straight line.

Question 3

$5y = 7x + 15$ and $2x + 3y = 15$ give $x = 30/31$, $y = 135/31$; graphically (0.97, 4.35) approximately.

Question 4

Gradient -1, intercept -1; equation $y = -x - 1$.

Question 5

At 30 minutes, distance ≈ 2.6 km; 4.2 km occurs about 08:50; stationary for 10 minutes.