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GRADE 9 MATHEMATICS QUICK REVISION PACK

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Key formulas & reminders	Worked examples
Common mistakes	Mini practice + answers

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1. Number & Algebra Essentials

Indices

For a non-zero number a : $a^m \times a^n = a^{m+n}$, $a^m \div a^n = a^{m-n}$, $(a^m)^n = a^{mn}$, and $a^0 = 1$.

Worked example

Simplify $2^3 \times 2^5 \div 2^4$.
 $= 2^{3+5-4} = 2^4 = 16$.

Cubes and cube roots

A cube is formed by multiplying a number by itself three times. Example: $4^3 = 64$, so the cube root of 64 is 4.

Approximation & percentage error

Absolute error = |measured value - actual value|.

Percentage error = (absolute error / actual value) $\times$ 100%.

Common mistake

Do not add exponents when adding ordinary terms. For example, $2^3 + 2^3 = 8 + 8 = 16$, not 2^6 .

Quick check: Simplify $3^5 \div 3^2$. Round 7.846 to 2 decimal places.

2. Proportion, Rates & Money

Direct proportion

If y is directly proportional to x , then $y = kx$, where k is the constant of proportionality.

Inverse proportion

If y is inversely proportional to x , then $y = k/x$, so $xy = k$.

Speed

Speed = Distance / Time, Distance = Speed $\times$ Time, Time = Distance / Speed.

Worked example

A car travels 180 km in 3 hours. Average speed = $180 \div 3 = 60$ km/h.

Money reminder

Always identify the operation required before calculating. For percentage increase: **new value = original value $\times$ (1 + rate)**. For percentage decrease: **new value = original value $\times$ (1 - rate)**, where the rate is written as a decimal.

Common mistake

Keep units consistent. If distance is in kilometres and time is in minutes, convert time to hours before giving speed in km/h.

3. Straight Lines, Coordinates & Inequalities

Straight-line equation

A straight line is commonly written as $y = mx + c$, where m is the gradient and c is the y-intercept.

Gradient

$$m = (y_2 - y_1) / (x_2 - x_1).$$

Worked example

Find the gradient through (2, 3) and (6, 11).

$$m = (11 - 3) / (6 - 2) = 8 / 4 = 2.$$

Linear inequalities

Solve inequalities like equations, but when multiplying or dividing both sides by a **negative number**, reverse the inequality sign.

Example

$-2x > 8$. Dividing by -2 reverses the sign: $x < -4$.

Common mistake

For coordinates, always write points as (x, y) . When calculating gradient, subtract coordinates in the same order.

4. Measurement Essentials

Area

Rectangle: $A = lw$

Triangle: $A = \frac{1}{2}bh$

Circle: $A = \pi r^2$

Volume

Cuboid: $V = lwh$

Prism: $V = \text{cross-sectional area} \times \text{length}$

Cylinder: $V = \pi r^2h$

Density

Density = Mass / Volume. Therefore, Mass = Density $\times$ Volume and Volume = Mass / Density.

Worked example

A block has mass 540 g and volume 200 cm³. Density = $540 \div 200 = 2.7 \text{ g/cm}^3$.

Scale drawing

Read the scale carefully and use the same units before comparing drawing length with actual length.

Common mistake

Area uses square units (cm², m²), while volume uses cubic units (cm³, m³).

5. Similarity & Trigonometry

Similarity

Similar figures have the same shape. Corresponding angles are equal and corresponding lengths are in the same ratio.

Scale factor

Scale factor = image length / original length. If the linear scale factor is k , the area scale factor is k^2 .

Right-angled triangle trigonometry

$\sin \theta = \text{opposite} / \text{hypotenuse}$

$\cos \theta = \text{adjacent} / \text{hypotenuse}$

$\tan \theta = \text{opposite} / \text{adjacent}$

Memory aid

SOH - CAH - TOA

Worked example

If opposite = 6 cm and adjacent = 8 cm, $\tan \theta = 6/8 = 0.75$. Hence $\theta = \tan^{-1}(0.75) \approx 36.9^\circ$.

Common mistake

Identify the sides relative to the angle you are using. The hypotenuse is always opposite the right angle.

6. Data Handling & Probability

Mean

Mean = sum of values / number of values.

Grouped data

For grouped data, a useful representative value for each class is the **class midpoint**: (lower boundary + upper boundary) / 2.

Probability

$P(\text{event}) = \text{favourable outcomes} / \text{total equally likely outcomes}$. Probability lies between 0 and 1.

Complement

$P(\text{not } A) = 1 - P(A)$.

Worked example

A bag contains 5 red and 3 blue counters. $P(\text{red}) = 5/8$. $P(\text{not red}) = 3/8$.

Common mistake

Do not confuse frequency with probability. Probability is a ratio; frequency is a count.

7. Mini Practice Exercise

Try these without looking at the answers. Show your working where necessary.

1. Simplify $5^3 \div 5$.
2. Find the cube root of 216.
3. A quantity increases from 800 to 920. Find the percentage increase.
4. y is directly proportional to x . If $y = 18$ when $x = 6$, find y when $x = 10$.
5. A cyclist covers 42 km in 2.5 hours. Find the average speed.
6. Find the gradient of the line through (1, 4) and (5, 12).
7. Solve: $3x - 5 \leq 16$.
8. Find the area of a triangle with base 14 cm and perpendicular height 9 cm.
9. A solid has mass 1.2 kg and volume 500 cm^3 . Express its density in g/cm^3 .
10. A model is made to scale 1:50. A length on the model is 8 cm. Find the actual length in metres.
11. In a right-angled triangle, opposite = 9 cm and hypotenuse = 15 cm. Find $\sin \theta$.
12. Find the mean of 4, 7, 9, 10 and 15.
13. A fair die is rolled. Find the probability of getting a number greater than 4.
14. If $P(A) = 0.37$, find $P(\text{not } A)$.
15. A rectangle is enlarged by linear scale factor 3. By what factor does its area increase?

8. Answers

Question	Answer
1	25
2	6
3	15%
4	30
5	16.8 km/h
6	2
7	$x \leq 7$
8	63 cm ²
9	2.4 g/cm ³
10	4 m
11	3/5 or 0.6
12	9
13	$2/6 = 1/3$
14	0.63
15	9

Revision tip

If you missed a question, do not only copy the answer. Return to the rule or formula, redo the question, then try a similar one.

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