

Numbers and the number system – supported focus
4MA1 supported native-lesson focus only; qualification gaps remain

1. Supported teaching and tier boundary

Supported teaching and tier boundary

4MA1: Numbers and the number system. Version: Issue 2, November 2017; first assessment June 2018; linear Mathematics A.

2. Supported teaching and tier boundary

Supported teaching and tier boundary

Foundation teaching and Higher additions are labelled below. This reference packages the existing native-lesson crosswalk. It does not certify unreviewed specification rows or a whole qualification. Original diagnostics are separate and are not reproduced.

3. Exact arithmetic and estimation · Foundation

Exact arithmetic and estimation · Foundation

Prime factors reveal shared structure. Use the smallest common prime powers for the HCF and the largest for the LCM. Estimate before calculating; use brackets to preserve the order of operations.

4. Exact arithmetic and estimation · Foundation

Exact arithmetic and estimation · Foundation

$$72 = 2^3 \times 3^2, \quad 90 = 2 \times 3^2 \times 5, \quad \text{HCF} = 18$$

5. Exact arithmetic and estimation · Foundation

Exact arithmetic and estimation · Foundation

$72=2^3 \times 3^2$ and $90=2 \times 3^2 \times 5$. Their HCF is $2 \times 9=18$. Make 18 bags with 4 pencils and 5 pens each. Their LCM is $2^3 \times 3^2 \times 5=360$.

6. Exact arithmetic and estimation · Foundation

Exact arithmetic and estimation · Foundation

The HCF divides both numbers; the LCM is a multiple of both. They answer different questions. A decimal estimate is not an exact fraction.

7. Exact arithmetic and estimation · Foundation

Exact arithmetic and estimation · Foundation

For a non-calculator paper, keep fractions exact and show cancellation. For a calculator paper, enter the full expression and compare with your estimate.

8. Exact arithmetic and estimation · Higher

Exact arithmetic and estimation · Higher

Prime factors reveal shared structure. Use the smallest common prime powers for the HCF and the largest for the LCM. Estimate before calculating; use brackets to preserve the order of operations.

9. Exact arithmetic and estimation · Higher

Exact arithmetic and estimation · Higher

$$a = \prod p_i^{\alpha_i}, \quad b = \prod p_i^{\beta_i}, \quad \text{HCF}(a, b) = \prod p_i^{\min(\alpha_i, \beta_i)}$$

10. Exact arithmetic and estimation · Higher

Exact arithmetic and estimation · Higher

$72=2^3 \times 3^2$ and $90=2 \times 3^2 \times 5$. Their HCF is $2 \times 9=18$. Make 18 bags with 4 pencils and 5 pens each. Their LCM is $2^3 \times 3^2 \times 5=360$.

11. Exact arithmetic and estimation · Higher

Exact arithmetic and estimation · Higher

The HCF divides both numbers; the LCM is a multiple of both. They answer different questions. A decimal estimate is not an exact fraction.

12. Exact arithmetic and estimation · Higher

Exact arithmetic and estimation · Higher

For a non-calculator paper, keep fractions exact and show cancellation. For a calculator paper, enter the full expression and compare with your estimate.

Figure 13: Exact arithmetic and estimation

$$72 = 2^3 \times 3^2$$

$$90 = 2 \times 3^2 \times 5$$

Shared smallest powers: $2 \times 3^2 = 18$

Check the labelled values and conditions.

14. Integer indices and standard form · Foundation

Integer indices and standard form · Foundation

Use integer powers, square and cube roots and standard form with $1 \leq a < 10$. In multiplying powers with the same base, add indices; in division, subtract them.

15. Integer indices and standard form · Foundation

Integer indices and standard form · Foundation

$$a^m a^n = a^{m+n}$$

16. Integer indices and standard form · Foundation

Integer indices and standard form · Foundation

$0.000072 = 7.2 \times 10^{-5}$. Also $2^3 \times 2^4 = 2^7 = 128$. The square root of 81 is 9. Check a standard-form answer by writing it out as a decimal.

17. Integer indices and standard form · Foundation

Integer indices and standard form · Foundation

Index laws do not turn a sum into a single power: $2^3 + 2^4 = 24$, not 2^7 . Do not round a surd when an exact answer is requested.

18. Integer indices and standard form · Foundation

Integer indices and standard form · Foundation

This Foundation/Core lesson excludes fractional powers and surd rationalisation.
Estimate a result before using a calculator and retain the required precision.

19. Indices, surds and standard form · Higher

Indices, surds and standard form · Higher

For the same positive base, multiplication adds indices and division subtracts them. A negative index means reciprocal; a fractional index represents a root. Standard form has $1 \leq a < 10$.

20. Indices, surds and standard form · Higher

Indices, surds and standard form · Higher

$$a^m a^n = a^{m+n}, \quad a^{-n} = \frac{1}{a^n}, \quad a^{m/n} = (\sqrt[n]{a})^m$$

21. Indices, surds and standard form · Higher

Indices, surds and standard form · Higher

$0.000072 = 7.2 \times 10^{-5}$. Also $16^{(3/4)} = (16^{(1/4)})^3 = 2^3 = 8$. Simplify $\sqrt{72} = 6\sqrt{2}$, then rationalise $1/\sqrt{2} = \sqrt{2}/2$.

22. Indices, surds and standard form · Higher

Indices, surds and standard form · Higher

Index laws do not turn a sum into a single power: $2^3+2^4=24$, not 2^7 . Do not round a surd when an exact answer is requested.

23. Indices, surds and standard form · Higher

Indices, surds and standard form · Higher

Check powers of ten against the original quantity. Use surds for exact geometry, and round only the final length when the question asks for a decimal.

Figure 24: Indices, surds and standard form

$$0.000072 = 7.2 \times 10^{-5}$$

7.2 is the coefficient; -5 is the power

The coefficient is between 1 and 10

Check the labelled values and conditions.

25. Percentages, ratio and proportional reasoning · Foundation

Percentages, ratio and proportional reasoning · Foundation

A $p\%$ increase has multiplier $1+p/100$; a decrease has multiplier $1-p/100$. Reverse a percentage by dividing by the multiplier. In a ratio, first find the total number of parts.

26. Percentages, ratio and proportional reasoning · Foundation

Percentages, ratio and proportional reasoning · Foundation

$$P_{\text{new}} = P_{\text{old}} \left(1 + \frac{r}{100}\right)$$

27. Percentages, ratio and proportional reasoning · Foundation

Percentages, ratio and proportional reasoning · Foundation

Let the original price be P . The model is sale price $= 0.8P$. Hence $P = 240 / 0.8 = 300$. A later 20% increase gives $240 \times 1.2 = 288$, so the two changes do not cancel.

28. Percentages, ratio and proportional reasoning · Foundation

Percentages, ratio and proportional reasoning · Foundation

A percentage uses a stated base. Subtracting the percentages loses that base. For compound change, multiply the multipliers; do not add the percentages.

29. Percentages, ratio and proportional reasoning · Foundation

Percentages, ratio and proportional reasoning · Foundation

Use percentage multipliers and divide a total into ratio parts. This Foundation/Core lesson uses linear proportional contexts, not the advanced regression methods.

30. Percentages, ratio and proportional reasoning · Higher

Percentages, ratio and proportional reasoning · Higher

A $p\%$ increase has multiplier $1+p/100$; a decrease has multiplier $1-p/100$. Reverse a percentage by dividing by the multiplier. In a ratio, first find the total number of parts.

31. Percentages, ratio and proportional reasoning · Higher

Percentages, ratio and proportional reasoning · Higher

$$P_{\text{new}} = P_{\text{old}} \left(1 + \frac{r}{100}\right)$$

32. Percentages, ratio and proportional reasoning · Higher

Percentages, ratio and proportional reasoning · Higher

Let the original price be P . The model is sale price $= 0.8P$. Hence $P = 240 / 0.8 = 300$. A later 20% increase gives $240 \times 1.2 = 288$, so the two changes do not cancel.

33. Percentages, ratio and proportional reasoning · Higher

Percentages, ratio and proportional reasoning · Higher

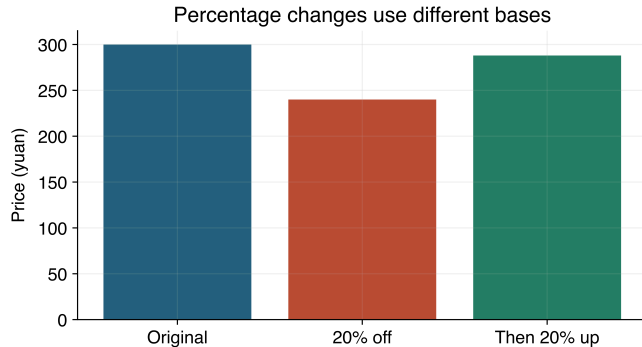
A percentage uses a stated base. Subtracting the percentages loses that base. For compound change, multiply the multipliers; do not add the percentages.

34. Percentages, ratio and proportional reasoning · Higher

Percentages, ratio and proportional reasoning · Higher

For direct proportion use $y=kx$; for inverse proportion use $y=k/x$. Calculate k from a known pair before using a new value. State what you held constant.

Figure 35: Percentages, ratio



Check the labelled values and conditions.

36. Accuracy, bounds and compound measures · Higher

Accuracy, bounds and compound measures · Higher

A value rounded to the nearest unit u lies from stated value $-u/2$ up to, but usually not including, stated value $+u/2$. For positive quantities, combine extremes according to the operation.

37. Accuracy, bounds and compound measures · Higher

Accuracy, bounds and compound measures · Higher

$$A = LW, \quad v = \frac{d}{t}$$

38. Accuracy, bounds and compound measures · Higher

Accuracy, bounds and compound measures · Higher

The lengths satisfy $7.95 \leq L < 8.05$ and $4.95 \leq W < 5.05$. Since $A = LW$, $39.3525 \leq A < 40.6525$. For speed d/t , the largest speed uses the largest distance and smallest positive time.

39. Accuracy, bounds and compound measures · Higher

Accuracy, bounds and compound measures · Higher

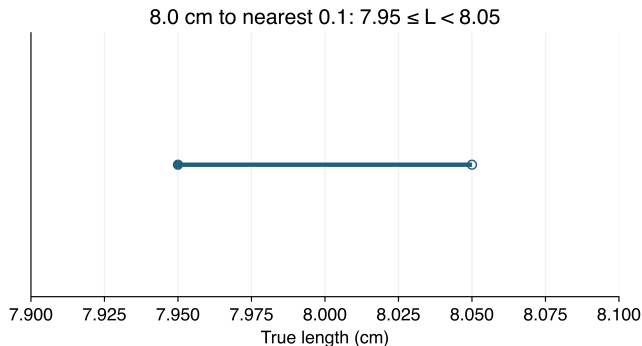
An upper bound is not automatically achieved. Dividing upper distance by upper time does not give the largest speed. Keep enough digits in intermediate calculations.

40. Accuracy, bounds and compound measures · Higher

Accuracy, bounds and compound measures · Higher

Distinguish measurement uncertainty from arithmetic rounding. A sensible reported precision cannot be finer than the measurements justify.

Figure 41: Accuracy, bounds and compound



Check the labelled values and conditions.

42. Remaining qualification limits

Remaining qualification limits

Official question-bank boundaries, scheme alignment and all objective-level teaching coverage require the recorded review; no practice registry promotion.

43. Remaining qualification limits

Remaining qualification limits

The authored diagnostic assessments are not full-length qualification mocks.

44. Remaining qualification limits

Remaining qualification limits

Only the mapped native skills are supplied here. Objective rows marked formula-review-required are not promoted to complete coverage by these print companions.

45. Terms

Terms

prime factor .

46. Terms

Terms	
index	.

47. Terms

Terms
multiplier .

48. Terms

Terms

lower bound .

Check yourself

Reconstruct the method without looking back

Decide whether this claim is true. Give a concrete calculation or counterexample: The HCF of two positive integers is always larger than either integer.