

✓ Secure ● Developing ! Not yet secure

The vertical bar indicates a question to rework. The tips in blue help you review the method.

Exercise 0 – Course questions

2/2

- 1) Write the definition of a prime number. 1/1
 - ✓ Definition excluding the number 1 Secure
 - ✓ Divisor property characterising a prime number Secure
- 2) Write the definition of an even number. 1/1
 - ✓ Complete and rigorous definition of an even number Secure
 - ✓ Correct idea of divisibility by 2, even if imprecise Secure

Exercise 1 – True or false

3,5/6

- 1) True or false? Justify. If a natural number is divisible by 6 and by 15, then it is divisible by 90. 1/1
 - ✓ Number chosen to test the statement, with its divisibility by 6 and by 15 checked Secure
 - ✓ Test of divisibility by 90 and conclusion Secure

- 2) True or false? Justify. The sum of five consecutive integers is a multiple of 5. 0/1

To rework. You wrote multiples of n instead of consecutive integers; re-read in the worked solutions how to express integers that follow one another.

- ! Factor identified as an integer and conclusion To review
 - ! Sum of the five consecutive integers written algebraically, simplified and factorised by 5 To review
- 3) True or false? Justify. The number $n = 2^2 \times 5 \times 11$ is a divisor of the number m , where $m = 2^3 \times 5^2 \times 11^3$. 1/1
 - ✓ Linking m and n : common factor, quotient or comparison of exponents Secure
 - ✓ Integer quotient (or compatible exponents) established and conclusion Secure
 - 4) True or false? Justify. The number $b = 2 \times 5^2 \times 11^2$ is a multiple of the number a , where $a = 5^3 \times 11$. 1/1
 - ✓ Justification of whether the quotient is an integer and conclusion Secure
 - ✓ Simplification of the quotient b/a or comparison of the exponents of the prime factor 5 Secure

- 5) True or false? Justify. Jean claims that the equality " $114 = 15 \times 7 + 9$ " represents the Euclidean division of 114 by 15. 0,5/1

To rework. The calculation verifying that the equality is correct is missing before checking the bounds on the remainder; see the worked solutions.

- ✓ Condition on the remainder checked and conclusion Secure
- ! Checking the equality by calculation To work on

- 6) True or false? Justify. The number 97 is prime. 0/1

To rework. Stating that the number cannot be factorised is not enough: review in the worked solutions the method of testing up to the square root.

- ! Numbers to test and stopping bound justified by the square root To work on
- ! Accurate divisibility tests by all required prime numbers and conclusion To work on

Exercise 2 – Fairy lights

5/6

1) After how many seconds will the two strings of fairy lights start an animation again at the same instant, for the first time? Justify.

4/4

- ✓ Accurate calculation of the LCM from the factorisations Secure
- ✓ Conclusion in context, with the unit Secure
- ✓ Conversion of both durations into seconds Secure
- ✓ Decomposition of the first duration into a product of prime factors Secure
- ✓ Decomposition of the second duration into a product of prime factors Secure
- ✓ Modelling by finding the lowest common multiple Secure

2) The fairy lights are switched on at 18:00. At what time will they start an animation again at the same instant, for the first time?

1/2

To rework. Your method for finding the time is correct, but your conversion of 525 seconds into minutes is wrong: check the division by 60 in the worked solutions.

- ! Conversion of the duration found into minutes and seconds To review
- ✓ Time of the first simultaneous start Secure

Exercise 3 – Fraction calculations

4,5/6

1) Calculate, showing each step, and give the result as a fraction in lowest terms:

1,5/2

$$A = \frac{7}{6} - \left(\frac{5}{4} - \frac{2}{3}\right) \div \left(-\frac{7}{8}\right).$$

To rework. You forgot to rewrite the term $7/6$ from the third step onwards; rework the end of the calculation using the worked solutions.

- ✓ Calculation of the difference in brackets Secure
- ✓ Calculation and simplification of the product, handling of signs Secure
- ✓ Division turned into multiplication by the reciprocal Secure
- ! Writing over a common denominator and final answer in lowest terms To work on

2) Calculate, showing each step, and give the result as a fraction in lowest terms:

0,5/1

$$B = \left(\frac{5}{6} - \frac{3}{4}\right)^{-1} \times \left(\frac{1}{3} - \frac{2}{5}\right).$$

To rework. The calculations in brackets are correct, but you forgot the exponent -1 on the first bracket; review how to take the reciprocal in the worked solutions.

- ✓ Accurate calculation of both differences in brackets Secure
- ! Reciprocal taken correctly and product simplified to a fraction in lowest terms To review

3) Calculate, showing each step, and give the result as a fraction in lowest terms: $C = \frac{\frac{2}{3} - \frac{5}{4}}{1 - \left(-\frac{1}{2}\right)^2}.$

1,5/2

To rework. Your method is well carried out, but you made an error in the denominator when calculating $1 - 1/4$; check this subtraction in the worked solutions.

- ! Calculation of the denominator To review
- ✓ Calculation of the numerator and the square Secure
- ✓ Calculation of the product and fraction in lowest terms Secure
- ✓ Quotient turned into multiplication by the reciprocal of the denominator Secure

4) Calculate, showing each step, and give the result as a fraction in lowest terms: $D = \frac{2}{3} - \frac{2}{3} \times 5.$

1/1

- ✓ Calculation of the difference and result in lowest terms Secure
- ✓ Priority of multiplication respected Secure

Exercise 4 – Flower bouquets**5/6****1)** What is the greatest number of bouquets she can make?**3/4**

To rework. The HCF method is well understood, but the prime factorisations of 264 and 462 are wrong; rework them using the worked solutions.

✓ Correct calculation of the HCF from the factorisations	Secure
✓ Conclusion in context	Secure
✓ Decomposition of 198 as a product of prime factors	Secure
! Decomposition of 264 as a product of prime factors	To review
! Decomposition of 462 as a product of prime factors	To review
✓ Identification of the highest common factor of the three numbers	Secure
2) In this case, state the composition of each bouquet.	2/2
✓ Written calculations justifying the composition	Secure
✓ Number of daisies per bouquet	Secure
✓ Number of roses per bouquet	Secure
✓ Number of tulips per bouquet	Secure

Exercise 5 – Euclidean division**0,5/2****1)** Carry out the Euclidean division of 2026 by 37.**0,5/1**

To rework. The form of the Euclidean equality is known, but the quotient and remainder are wrong; set out the division of 2 026 by 37 as in the worked solutions.

! Correct calculation of the quotient and remainder	To review
✓ Euclidean division equality written on one line	Secure

2) What is the smallest natural number to add to 2026 to obtain a multiple of 37?**0/1**

To rework. The calculation using the remainder of the Euclidean division to reach the next multiple of 37 is missing; check the worked solutions.

! Use of the remainder (or of the next multiple of 37)	To work on
! Verification and conclusion	To review

Exercise 6 – Products of prime factors**2/4****1)** We are given $P = 2^3 \times 3^2 \times 5$ and $Q = 2^2 \times 3 \times 7$. Write $P \times Q$ as a product of prime factors.**0,5/1**

To rework. The result is correct, but remember to write the step grouping the factors or adding the exponents, as in the worked solutions.

✓ Correct final decomposition	Secure
! Grouping factors with the same base and adding the exponents	To work on

2) Write P^2 as a product of prime factors.**0,5/1**

To rework. The result is correct, but the intermediate step on the exponents between the product and the final result is missing; see the worked solutions.

! Square applied to each factor, exponents multiplied by 2	To work on
✓ Correct final decomposition, including the exponent of each factor	Secure

3) Write Q^3 as a product of prime factors.**0,5/1**

To rework. The result is correct, but write out the calculation step on the exponents as shown in the worked solutions.

! Cube applied to each factor, exponents multiplied by 3	To work on
✓ Correct final decomposition, including the exponent of each factor	Secure

4) Let $R = 2^6 \times 3^2 \times 5^4$. Find a positive integer S , written as a product of prime factors, such that $R = S^2$. Check your answer.

0,5/1

To rework. Conclude explicitly by writing $S = \dots$ and check the result by expanding S^2 until you obtain the expression for R .

- ✓ Correct expression for S as a product of prime factors Secure
- ! Explicit verification that the square of S is equal to R To work on

Exercise 7 – Algorithms

2/5

1) Write on your paper the two messages to place in the commands to be completed.

Not attempted

To rework. Look at what the condition “Number modulo 13 = 0” tests in order to complete the two messages.

- ! Message in the “then” branch (remainder equal to 0) To work on
 - ! Message in the “else” branch (non-zero remainder) To work on
- 2) What will the sprite say if the user enters the number 752? Justify your answer. 1/1
- ✓ Sprite’s message deduced from the remainder Secure
 - ✓ Correct Euclidean division of 752 by 13, remainder highlighted Secure

3) What will the sprite say if the user enters the number 5 954? Justify your answer.

0/1

To rework. Set out the Euclidean division of 5 954 by 13 to find the quotient and remainder, then deduce the sprite’s message.

- ! Sprite’s message deduced from the remainder To work on
 - ! Correct Euclidean division of 5 954 by 13, remainder highlighted To work on
- 4) What are the possible remainders in the Euclidean division of a natural number n by 13? 1/1
- ✓ Complete list of possible remainders Secure

Exercise 8 – The SCRIPT pattern

0/2

1) Which letter will be printed in position 2 028? Justify your answer.

0/1

To rework. You rightly spotted the pattern length of 6: finish the Euclidean division of 2 028 by 6 to interpret the remainder using the worked solutions.

- ! Interpretation of the remainder and letter obtained To work on
- ! Period of the pattern identified and Euclidean division of 2 028 by this period To work on

2) Which letter will be printed in position 2 029? Justify your answer.

Not attempted

To rework. Use the letter in position 2 028 or the remainder when 2 029 is divided by 6 to find the next letter.

- ! Justification for moving to the next position (or division of 2 029) To work on
- ! Letter obtained To work on

Exercise 9 – Neatness, presentation and spelling

1/1

Neatness, presentation and spelling of the paper.

- ✓ Neat paper: legible, clean crossings-out, results easy to spot Secure
- ✓ Correct spelling and written expression Secure

Exercise 10 – Bonus

0/1

For every natural number n , prove that the number $2^{n+2} \times 3^n + 3^{n+1} \times 2^n$ is divisible by 7.

Not attempted — question to rework in full.

To rework. Bonus not attempted: break down the powers to factor out $2^n \times 3^n$ as detailed in the worked solutions.

- ! Integer argument and conclusion for every natural number n To work on
- ! Breaking down the powers and factorisation bringing out 7 To work on

Skills assessed in this test:

Topic	Skill assessed	Level
Computational thinking	Predict the value of a computing expression before execution	Developing
	Write conditional statements	Not yet secure
Numbers and calculations	General expression for an even or odd number	Secure
	Use algebraic calculation to produce proofs	Not yet secure
	Use a counterexample to show that a statement is false	Secure
	Apply the divisibility rules for 2, 3, 5, 9	Not yet secure
	Factorise a positive integer (e.g. $60 = 2^2 \times 3 \times 5$)	Secure
	Add, subtract, multiply and divide fractions	Secure
	Find the reciprocal of a fraction	Developing
	Write a fraction in lowest terms	Secure
	Essential role of brackets in the meaning of expressions	Secure
	Add, subtract, multiply, divide to solve problems; check the plausibility of the result	Secure
	Multiples and divisors	Secure
	Order of operations	Secure
	Quotient and remainder in Euclidean division (e.g. $17 = 3 \times 5 + 2$)	Developing
	Multiplication of powers of the same number with positive exponents	Developing
	Multiply and divide powers	Developing

Secure: at least 75% of the points on the relevant questions. Developing: from 40% to under 75%. Not yet secure: below 40%.

Correction work – on a separate sheet, rework the questions marked **!** or **!** using the worked solutions handed out, then explain in a few sentences the mistake you made; this explanation must be written **in red** or **in green** so that it stands out clearly. Neat, careful reworking may allow you to earn back **up to 1 point**.