Queen Mary
University of London

Foundation-level examination by course unit 2011

SEF026 Essential Foundation Mathematical Skills

Duration: 2 hours

Date and time: 27 MAY 2011, 10:00h–12:00h (2h)

Apart from this page, you are not permitted to read the contents of this question paper until instructed to do so by an invigilator.

You should attempt all questions. Record each answer by ticking the corresponding box on the answer form. To pass the examination you need 18 correct answers.

Calculators are NOT permitted in this examination. The unauthorized use of a calculator constitutes an examination offence.

Candidates should note that the Examination and Assessment Regulations state that possession of unauthorized materials by any candidate who is under examination conditions is an assessment offence. Please check your pockets now for any notes that you may have forgotten that are in your possession. If you have any, then please raise your hand and give them to an invigilator now.

Exam papers must not be removed from the examination room.

Examiner(s): D. Burgess

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1. Compute the remainder of the following division: $1068 \div 8$.

[a] 4 [b] 5 [e] not in the list
[c] 6 [d] 1

2. Determine the number of primes lying between 7 and 32, end-points included.

[a] 6 [b] 7 [e] not in the list
[c] 8 [d] 9

3. Compute the greatest common divisor of 6^2 and 60.

[a] 4 [b] 6 [e] not in the list
[c] 12 [d] 180

4. Determine the least common multiple of 24 and 21.

[a] 42 [b] 168 [e] not in the list
[c] 176 [d] 180

5. Determine the integer part of $\dfrac{2011}{9}$.

[a] 222 [b] 233 [e] not in the list
[c] 224 [d] 223

6. How many of the following equalities are correct:

$$2.4 = \frac{120}{5}\,, \qquad 0.004 = \frac{1}{250}\,, \qquad 1.217 = \frac{121.7}{1000}\,, \qquad 0.125 = \frac{11}{88}\,?$$

[a] 1 [b] 2 [c] 3 [d] 4 [e] not in the list

7. Evaluate

$$\left(\frac{-5^2}{6}\right)^2 \div \frac{-100}{3^2}\,.$$

[a] $-\frac{25}{16}$ [b] $\frac{5}{4}$ [c] $\frac{25}{16}$ [d] $-\frac{25}{36}$ [e] not in the list

8. Evaluate

$$\left[\frac{3}{12} + \frac{1}{2} + \frac{1}{10} - \frac{2}{5}\right] \times \frac{3}{7}\,.$$

[a] $\frac{3}{20}$ [b] $\frac{8}{35}$ [c] $\frac{4}{70}$ [d] $\frac{27}{140}$ [e] not in the list

9. Simplify $\sqrt{4500}$ to the form $a\sqrt{b}$ where b is square-free.

[a] $50\sqrt{9}$ [b] $20\sqrt{5}$ [c] $30\sqrt{5}$ [d] $50\sqrt{3}$ [e] not in the list

10. Simplify, eliminating radicals at denominator,

$$\frac{\sqrt{3}}{2} - \sqrt{\frac{16}{3}} + \frac{1}{\sqrt{48}}\,.$$

[a] $\dfrac{3\sqrt{3}}{4}$ [b] $\dfrac{-3\sqrt{3}}{4}$

[c] $\dfrac{-5\sqrt{3}}{6}$ [d] $\dfrac{5\sqrt{3}}{6}$

[e] not in the list

11. Place the following numbers in ascending order:

$a = 35.2 \times 10^{-1}\,, \quad b = 0.00351 \times 10^{3}\,, \quad c = 3051 \times 10^{-2}\,, \quad d = 30.051.$

[a] $a < b < c < d$ [b] $b < a < c < d$

[c] $a < b < d < c$ [d] $b < a < d < c$

[e] not in the list

12. Determine the largest power of 10 smaller than

$$\frac{35999}{6} \times \frac{100}{6001}\,.$$

[a] 10^1 [b] 10^2

[c] 10^3 [d] 10^4

[e] not in the list

13. Estimate

$$x = \frac{20}{5 \times 10^{-1}} \times \frac{1.1001 \times 10^4}{8}\,.$$

[a] $4 \times 10^4 < x < 5 \times 10^4$ [b] $5 \times 10^5 < x < 5.5 \times 10^5$

[c] $5.5 \times 10^5 < x < 6 \times 10^5$ [d] $5 \times 10^4 < x < 6 \times 10^4$

[e] not in the list

14. When $4ab^2 - 36a$ is factored completely, which of the following is one of the factors?

[a] $b^2 - 9$ [b] $b - 3$ [e] not in the list

[c] 36 [d] $b^2 - 9a$

15. When $2x^3 + yx^2 + 2x + y$ is factored completely, which of the following is one of the factors?

[a] $x^2 - 1$ [b] $x^2 + y$ [e] not in the list

[c] $2x + 1$ [d] $2 + y$

16. Compute the quotient of the following division:

$$(x^3 + 3x + 9) \div (x + 1)\,.$$

[a] $x^2 - x + 2$ [b] $x^2 + x - 4$ [e] not in the list

[c] $x^2 + x - 2$ [d] $x^2 - x + 4$

17. Compute the remainder of the following division:

$$(y^3 + 2y^2 - 4y - 1) \div (y^2 + 1)\,.$$

[a] $-5y - 3$ [b] $-3y - 3$ [e] not in the list

[c] $-5y + 1$ [d] $-4y - 1$

18. Simplify

$$\frac{3y}{y^2 + 4 + 4y} - \frac{y + 1}{2 + y}\,.$$

[a] $\dfrac{2 - y^2}{(y + 2)^2}$ [b] $\dfrac{-y^2 - 2y}{(2 + y)^2}$ [e] not in the list

[c] $-\dfrac{y^2 + 2}{(y + 2)^2}$ [d] $\dfrac{-y^2 + 2}{(y + 2)}$

19. Simplify

$$\left(\frac{-k^2l^3m}{ml}\right)^4 \div km^2.$$

[a] $\dfrac{k^4l^8}{m}$ [b] $\dfrac{k^8l^8}{m^2}$

[c] $-\dfrac{k^8l^{12}m^3}{km^2l}$ [d] $\dfrac{k^4l^{11}}{m^2}$

[e] not in the list

20. Compute $f(-3)$, where

$$f(x) = \frac{2x^2 + x^3 + 1}{x^2 - 1}\,.$$

[a] -1 [b] 1

[c] $-\dfrac{9}{8}$ [d] $\dfrac{47}{8}$

[e] not in the list

21. Compute $h(-2/s)$, where

$$h(x) = \frac{-x}{x^2 - 2x + 1}\,.$$

[a] $\dfrac{-2s}{s^2 - 4s - 4}$ [b] $\dfrac{-s}{s^2 - 2s + 1}$

[c] $\dfrac{2s}{s^2 - 2s + 1}$ [d] $\dfrac{-2s}{-4s^2 + 4s + 1}$

[e] not in the list

22. Solve

$$\frac{x}{3} > \frac{2+x}{2}\,.$$

[a] $x < 6$ [b] $x > 6$ [e] not in the list

[c] $x < -6$ [d] $x > -6$

23. Solve for x and y

$$y + 3x = -1, \qquad 2x = 39 + 5y\,.$$

[a] $x = 1, \quad y = -4$ [b] $x = -2, \quad y = 5$

[c] $x = 2, \quad y = -7$ [d] $x = -2, \quad y = 7$

[e] not in the list

24. Solve

$$3 + x = 2x^2\,.$$

[a] $x = -\frac{3}{2}, \quad x = -1$ [b] $x = \frac{3}{2}, \quad x = -1$

[c] $x = -\frac{3}{2}, \quad x = 1$ [d] $x = \frac{3}{2}, \quad x = 1$

[e] not in the list

25. Solve

$$x^2 + 2x - 5 = 0\,.$$

[a] $x = -1 \pm \sqrt{6}$ [b] $x = -2 \pm \sqrt{12}$

[c] $x = -1 \pm \sqrt{5}$ [d] $x = -2 \pm \sqrt{24}$

[e] not in the list

End of Paper