Progress exam 11 October 2016

Section I

1. What is $1.3\dot{2}\dot{9}$ as a fraction?

A. $\frac{1329}{1000}$ B. $1\frac{329}{1000}$ C. $1\frac{163}{495}$ D. $1.3\frac{29}{1000}$ E. $1\frac{329}{495}$ F. $\frac{990}{1316}$

2. Expand $(t-5)(t+2)$.

A. $t^2-10t+7$ B. $t^2-7t+10$ C. $t^2+10t-7$ D. $t^2+7t-10$ E. None of these

3. Solve for x in $x/4+1/2=4$.

A. 32 B. 8 C. 18 D. 9 E. 14 F. 7

4. Which of these describes a scalene triangle?

A. All sides equal B. All angles equal C. No equal angles D. Two equal sides

5. Is $f(x)=\pm(x^2-2)$ a function?

A. Yes B. No C. Only for $x\neq\pm2$ D. Only for $|x|>2$

6. In a right-angled triangle with side lengths of 3 cm, 4 cm and 5 cm, what is the approximate value of the smallest internal angle?

A. 36° 52′ 12″ B. 36° 87′ C. 38° 39′ 35″ D. 38° 66′ E. 53° 7′ 48″ F. 53° 13′

7. Find the distance between the points (1, 3) and (−3, 0).

A. 1 B. 2 C. 3 D. 4 E. 5 F. 6

8. What is the derivative of $1/x$?

A. $1/x^2$ B. $-1/x^2$ C. x D. $-x$ E. $2x^2$ F. $-2x^2$

9. Find $a+b$ and $a\,b$ if a and b are the roots of $x^2+2x+1=0$.

A. $a+b=-1$; $a\,b=2$ B. $a+b=1$; $a\,b=-2$ C. $a+b=2$; $a\,b=-1$ D. $a+b=-2$; $a\,b=1$

10. The latus rectum is:

A. An intercept B. A line C. A point D. A gradient

Section II

11. What is $8^{-4/3}$?

A. 8^{-12} B. 32^{-3} C. $8^{-4}/8^{3}$ D. 16 E. 16^{-1} F. $-8^{4/3}$

12. Expand $(p\ p + 5)(p\ p + 2)$.

A. $p^2 + 7p + 10$ B. $p\ p^2 + 7p + 10$ C. $p^4 + 7p^2 + 10$ D. $p^3 + 7p^2 + 10p$ E. None of these

13. Factorise $5y^2 - 13y + 6$.

A. $(5y - 3)(y - 2)$ B. $(y - 3)(5y - 2)$ C. $(5y - 6)(y - 1)$ D. $(y - 6)(5y - 1)$ E. $(y - 5)(y - 6)$

14. Solve for b in $|5b - 7| \geq 3$.

A. $b = 2$ B. $b \geq 2$ C. $b \geq 2,\ b \leq -2$ D. $b \geq 2,\ b \geq 4/5$ E. $b \geq 2,\ b \leq 4/5$

15. Which of the following is true?

A. Diagonals in a rhombus bisect at 90° B. A square is a type of parallelogram
C. A trapezium is a type of quadrilateral D. In a rectangle, all sides can be equal
E. All of A, B, C & D E. None of A, B, C & D

16. What are the x and y-intercepts of the parabola described by $y = x^2 - 1$?

A. $x=\pm1;\ y=\pm1$ B. $x=+1;\ y=-1$ C. $x=\pm1;\ y=-1$ D. $x=-1;\ y=\pm1$ E. $x=-1;\ y=-1$

17. Triangle XYZ has XY = 5.4 cm, $\angle$ZXY = 48° and $\angle$XZY = 63°. What is XZ?

A. 4.5 cm B. 90° C. 8.0 cm D. 3.1 cm E. None of these

18. If the lines $3x - 2y + 5 = 0$ and $y = k\ x - 1$ are perpendicular, find the value of k.

A. −3/2 B. −2/3 C. −2/5 D. +2/5 E. +2/3 F. +3/2

19. Differentiate $(5x + 4)^7$.

A. $7(5x + 4)^6$ B. $7x^6$ C. $35(5x + 4)^6$ D. $5(5x + 4)^6$

20. Find the discriminant of $-2x^2 + x + 2 = 0$.

A. −17 B. −16 C. −15 D. +15 E. +16 F. +17

21. What is the equation of the parabola whose focus is located at (0, 2) and whose directrix is $y = -2$?

A. $y^2 = -8x$ B. $y^2 = +8x$ C. $x^2 = -8y$ D. $x^2 = +8y$ E. $8y^2 = -x$ F. $8y^2 = +x$

Section III

22. What denominator is initially obtained when rationalising the denominator of $\dfrac{2\sqrt{3}+\sqrt{5}}{\sqrt{3}+4\sqrt{2}}$?

A. +48 B. −48 C. +23 D. −23 E. +29 F. −29

23. Solve for y by completing the square $y^2+2y-7=0$.

A. $\pm 2\sqrt{2}+1$ B. $\pm 2\sqrt{2}-1$ C. $2\sqrt{2}\pm 1$ D. $-2\sqrt{2}\pm 1$ E. $\pm(2\sqrt{2}+1)$ F. $\pm(2\sqrt{2}-1)$

24. Solve for x and y given $xy=6$ and $x+y=5$.

A. x=3, y=3; x=2, y=2 B. x=2, y=2; x=3, y=3 C. x=2, y=3; x=3, y=2 D. x=3, y=6; x=2, y=5 E. x=2, y=5; x=3, y=6

25. What is the value of each internal angle in a regular pentagon?

A. 60° B. 90° C. 108° D. 180° E. 360° F. 720°

26. What are the asymptotes of the function $y=3/(x-3)$?

A. x=±1; y=±1 B. x=±3; y=±3 C. x=1; y=1 D. x=3; y=3 E. x=3; y=0

27. Simplify $(\sec\theta)\sqrt{\sin^4\theta+\dfrac{\sin^2\theta}{\sec^2\theta}}$

A. sin(θ) B. cos(θ) C. tan(θ) D. sec(θ) E. cosec(θ) F. sin(θ)

28. Find the equation of the straight line passing through (2, −3) and (−4, −7).

A. $3x-2y+13=0$ B. $2x-3y+13=0$ C. $3x-2y-13=0$ D. $2x-3y-13=0$

29. Is the following function differentiable at all points? Why?

$$f(x)=\begin{cases}3x^3 & \text{for } x<0\\ 2x^2 & \text{for } x\geq 0\end{cases}$$

A. Yes: f(x) is continuous and smooth
B. No: f(x) is not continuous
C. No: f(x) is not smooth
D. No: f(x) is not continuous or smooth

30. What is the gradient of the curve $y=2x/(3x+1)$ at the point (1, 1/2) ?

A. 1/8 B. 1/6 C. 1/4 D. 1/2 E. 1 F. 2

31. How many times does the function $y = x^2 - x + 5$ cross the x-axis?

A. None B. Once C. Twice D. Thrice

32. What is the focal length of the parabola with equation $y^2 + 4y + 8x - 4 = 0$?

A. 1/3 B. 1/2 C. 1 D. 2 E. 3 F. 4