Name: _____

PRACTICE EXAM

Year 11 Mathematical Methods Exam 1

- Time allowed: 40 minutes
- Technology-enabled exam
- 26 multiple-choice questions (26 marks)

1 The factorised form of $x^3 - 3x^2 - 4x + 12$ is:

A $(x - 3)(x - 4)(x + 12)$

B $(x + 2)(x + 2)(x - 3)$

C $(x - 2)(x + 2)(x - 3)$

D $(x - 2)(x - 2)(x - 3)$

E $(x - 1)(x + 4)(x - 3)$

2 If $(x - 2)(x + 3)$ is a factor of $3x^3 + ax^2 - 17x - 6$ then a is equal to:

A 4

B -6

C -4

D 0

E 1

3 On a biased six sided die $P(1) = P(2) = P(3) = P(6) = \frac{1}{5}$ and $P(4) = 2P(5)$. The probability of rolling a 4 is:

A $\frac{1}{12}$

B $\frac{1}{6}$

C $\frac{1}{3}$

D $\frac{2}{15}$

E $\frac{1}{15}$

4 At a senior secondary school campus the probability of a student studying Mathematics or Chemistry is $\frac{9}{10}$. Half of the students study Mathematics and $\frac{3}{5}$ of the students study Chemistry. The probability that a randomly selected student studies both Mathematics and Chemistry is:

A $\frac{3}{10}$

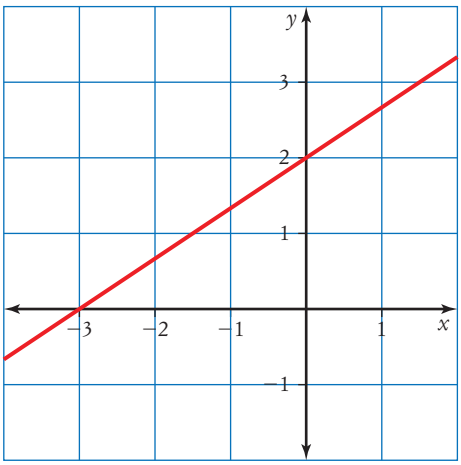
B $\frac{1}{5}$

C $\frac{7}{10}$

D $\frac{1}{10}$

E $\frac{1}{2}$

5 The equation of the straight line shown at right is:



A $y = -3x + 2$

B $2x - 3y + 6 = 0$

C $3x + 2x - 6 = 0$

D $2x + 3y + 6 = 0$

E $y = 2x + 3$

6 The domain and range of $y = -(x - 2)^2 + 3$ is:

A domain = R, range = $y \leq 3$

B domain = $x \leq 2$, range = $y \geq 3$

C domain = R, range = $y \geq 3$

D domain = R, range = R

E domain = R, range = $y \leq -3$

7 The centre and radius of the circle with the equation $x^2 + 6x + y^2 - 2y - 6 = 0$ are:

A $(-3, 1)$ and 16

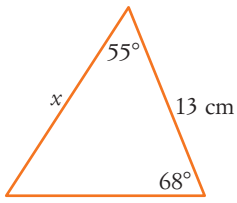
B $(3, -1)$ and 4

C $(-6, 2)$ and 4

D $(-3, 1)$ and 6

E $(-3, 1)$ and 4

8 Which statement is correct for the triangle at right?



A $\frac{x}{\sin(68°)} = \frac{13}{\sin(55°)}$

B $\frac{x}{\sin(68°)} = \frac{13}{\sin(57°)}$

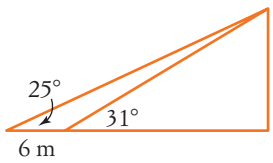
C $\frac{x}{\sin(55°)} = \frac{13}{\sin(68°)}$

D $\frac{x}{\sin(57°)} = \frac{13}{\sin(68°)}$

E $\frac{x}{\sin(57°)} = \frac{13}{\sin(55°)}$

9 The angle of elevation measured from a farmer to the top of a tree is 25°. He walks 6 m closer to the tree and measures the angle of elevation as 31°.

Find the height of the tree to the nearest centimetre.



A 1.31 m

B 7.31 m

C 12.49 m

D 20.79 m

E 47.10 m

10 When converted to radian measure 58.9° is approximately equal to:

A 1.124

B 0.956

C 1.055

D 1.820

E 1.028

11 A bag contains 5 yellow flesh nectarines and 8 white flesh nectarines. If the first 3 nectarines Sally picks are white flesh then the probability the next nectarine will also be a white flesh is:

A $\frac{1}{5}$

B $\frac{1}{13}$

C $\frac{1}{2}$

D $\frac{3}{13}$

E $\frac{1}{8}$

12 A group of 25 students contains 18 that are in the school play, 15 that are in the soccer team and 10 that are in both. The probability that a student in the school play is also in the soccer team is:

A $\frac{5}{9}$

B $\frac{2}{5}$

C $\frac{3}{5}$

D $\frac{18}{25}$

E $\frac{1}{10}$

13 The period and amplitude of $y = -5\cos\left(\frac{\pi x}{3}\right)$ is:

A $\frac{\pi}{3}$ and 5

B 3 and 5

C 6 and -5

D $\frac{2\pi}{3}$ and 5

E 6 and 5

14 $\cos(a + b)$ is equivalent to

A $\sin(a)\cos(b) - \sin(a)\cos(b)$

B $\cos(a)\cos(b) + \sin(a)\sin(b)$

C $\sin(a)\cos(b) + \cos(a)\sin(b)$

D $\cos(a)\cos(b) - \sin(a)\sin(b)$

E $\cos(a)\sin(b) - \sin(a)\cos(b)$

15 The average rate of change for $f(x) = 2x^2 + x^3$ between $x = 1$ and $x = 3$ is

A 45

B 7

C 20

D 11

E 21

16 The fourth term of the sequence defined by $t_1 = 5, t_n = 2t_{n-1} + 1$ is

A 47

B 11

C 40

D 23

E 5

17 The number of terms in the sequence 6, 12, 24, … 3072 is:

A 5

B 11

C 10

D 7

E 9

18 If $f(x) = 5x^2 - x + 2$, then $f'(1) =$

A 21

B 11

C 6

D 5

E 9

19 The antiderivative of $3(x + 3)^2$ is:

A $3x^2 + 18x + 27$

B $x^3 + 27x + c$

C $x^3 + 9x^2 + 27x + c$

D $x^3 - 9x^2 - 27x + c$

E $6x + 18$

20 The solution of $2^{x+2} - 512 = 0$ is:

A 7

B 9

C 11

D 10

E 256

21 The equation $9^x - 10(3^x) + 9 = 0$ can be solved by substituting in $a = 3^x$. The solution is:

A $x = 1$

B $x = \{0, 3\}$

C $x = \{1, 2\}$

D $x = \{0, 2\}$

E $x = \{1, 9\}$

22 The function $f(x)$ has a derivative that can be factorised to $f'(x) = (x + 2)(3 - x)$. $f(x)$ has:

A x-intercepts at $x = -2$ and $x = 3$

B a minimum at $x = -2$ and a maximum at $x = 3$

C a minimum at $x = 2$ and a maximum at $x = -3$

D a maximum at $x = -2$ and a minimum at $x = 3$

E a maximum at $x = 2$ and a minimum at $x = -3$

23 The position of a particle is given by $x = t^2 + 2t - 3$ cm, where t is in seconds.

The initial velocity is:

A -3 cm/s

B 4 cm/s

C 0 cm/s

D 6 cm/s

E 2 cm/s

24 The point on the curve $f(x) = x^2 + x$ that has a gradient of -3 is:

A $\frac{-1 \pm \sqrt{13}}{2}$

B $(-2, 2)$

C $(-2, -6)$

D $(1, 2)$

E $(-1, 0)$

25 The gradient of the secant of the function $f(x) = 3x^2$ is:

A $6xh + 3h^2$

B $3h$

C $\frac{6xh + 3h^2}{h}$

D $6x + 3h^2$

E $6x$

26 $\lim\limits_{x \to 1}\left(\frac{x^2 - 1}{x^2 + x - 2}\right)$ is equal to:

A $\frac{2}{3}$

B not defined

C 0

D -1

E $\frac{1}{2}$