Degree Examination

MA1004 Introductory Mathematics 1

Monday 24 January 2005   (9am to 11am)

Only calculators approved by the Department of Mathematical Sciences may be used in this examination. Calculator memories must be clear at the start of the examination.

Marks may be deducted for answers that do not show clearly how the solution is reached.

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1. Simplify $3g + 4s + g$.

2. Simplify $(3q^5)^3$ to aq^b.

3. Give the Highest Common Factor of $25gh$ and $35h$.

4. Solve the following equation for x:
$$2x - 7 = -4.$$
(Your answer must be an integer or a fraction in lowest terms.)

$x =$

5. Change the subject of the formula
$$m = n + ap$$
to p.

$p =$

6. Evaluate
$$x(y - 9(x - 7z))$$
when $x = -2$, $y = -4$ and $z = 1$.

7. Simplify $(d - 1)(d + 4)$.

8. Factorise
$$18x^2 + 65x - 72.$$
(Enter your answer in a COMPLETELY simplified form.)

9. Factorise
$$6x^2 - 5x - 6.$$
(Enter your answer in a COMPLETELY simplified form.)

10. Simplify the expression
$$\frac{3a^5a^4}{(3a^2)^2}$$
to $\frac{m}{n}a^p$ where $\frac{m}{n}$ is a fraction expressed in its lowest form.

11. Change the subject of the formula
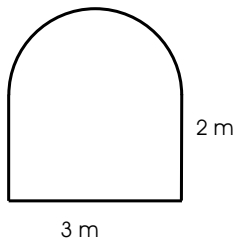$$d = ut + \frac{1}{2}at^2$$
from d to u.

12. Solve the equation
$$2x - 7(6x + 5) = 3 - 8(8 - 2x).$$
(The answer must be a fraction in lowest terms.)

$x =$

13. Solve
$$6x^2 + 7x - 20 = 0.$$
(Each answer must be integer or vulgar fraction in lowest terms.)
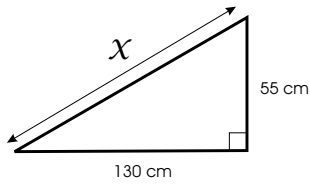
$x =$ or

14. Find the area of this shape.

14 cm

10 cm   8 cm

2 cm

cm^2
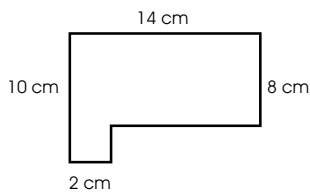
15. Find the area of this arched window.

2 m

3 m

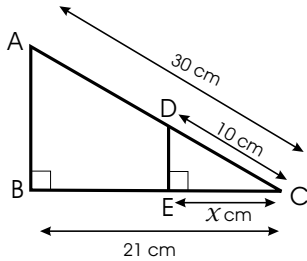(Give your answer correct to 1dp and take $\pi = 3.14$.)

m^2

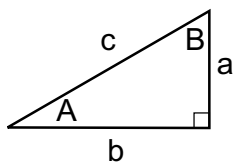**16.** This is a sketch of the ramp which is needed to allow disabled access into the medical centre.

Calculate the length of the slope. (Give your answer to 1dp.)

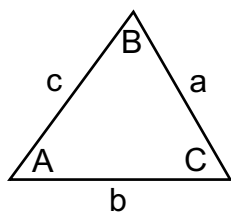cm

17. Simplify $\dfrac{2x}{y} \times \dfrac{z}{9}, \quad y \neq 0.$
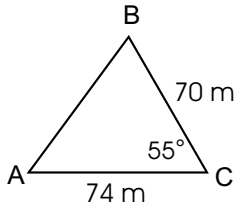
18. Use similar triangles to find x.

19. Given $c = 3.9$ and $b = 2.4$, what is A?

°

20. Given $C = 80.4°$, $c = 6.5$ and $b = 5.1$, calculate B in degrees, giving your answer correct to the nearest degree.

21. A triangular parking area is shown. Calculate the length of AB to the nearest metre.

	m

22. Find the remainer when $f(x) = x^3 - x^2 - x + 2$ is divided by $(x - 1)$.

Remainder =

23. Find value of p if $(x - 3)$ is a factor of $x^3 - x^2 + px + 9$.

$p =$

24. Solve for x exactly.
$$(1024)^x = (16)^8.$$
Do not use a calculator. (Each answer must be integer or vulgar fraction in lowest terms.)

$x =$

25. Express as a single log
$$-4\log_5 11 + 8\log_5 4 - 8\log_5 44.$$
Answer in the form $x\log_b y$ where y has the smallest possible value.

26. Given that $\log_{10} y = 1.5$, enter an expression for the **exact** value of y.

$y =$

27. Find $f'(x)$ where $f(x) = (x + 1)^{1/3}$.

$f'(x) =$

28. Given that
$$f(x) = 2x^3 - 2x^2 + 3x + 5,$$
find the value of $f'(4)$.

$f'(4) =$

29. Find the derivative of the following function of x:
$$f(x) = (x - 2)(3x - 7).$$
Give your answer in fully simplified form.

$f'(x) =$

30. Find the maximum value of
$$y = -3x^2 + 2x - 3.$$
Give your answer as an integer or a fraction in lowest terms.

maximum value =