Are you ready for MST124?

Welcome to the *Are you ready for MST124?* quiz.

If possible, you should try to attempt this quiz online at
`http://mathschoices.open.ac.uk/are-you-ready-quizzes/mst124-quiz`.
The online version of this quiz can provide more personalised feedback
than this offline version.

Essential mathematics 1 (MST124) will assume that you can answer most
of the questions in these quizzes correctly before you begin the module.
This quiz will help you assess whether you have the necessary
mathematical skills and which skills you might need to brush up on for
MST124.

There are twenty questions, and you should try to answer every question.

Use pen and paper for your working, and a scientific calculator where
needed.

Keep a note of how long it takes you to complete the quiz. You may need
up to an hour. If it takes you substantially longer you may have the
mathematical potential but the pace of MST124 may be too demanding,
so you should consider doing Discovering mathematics (MU123) instead.

Answers, and advice based on your score, are provided in a separate
document. You should not open that document until you have answered
all the questions to the best of your ability.

Good luck!

Question 1

What is the value of the expression

$$a(a - b) - ab - a^2$$

when $a = -4$ and $b = 3$?

Question 2

A ladder of length $7.6\,\mathrm{m}$ is propped on horizontal ground against a vertical wall, with its bottom end at a distance of $1.4\,\mathrm{m}$ from the wall. How high up the wall is the top end?

Give your answer in metres to one decimal place.

Question 3

Multiply out the brackets and simplify the expression

$$cd^2(3c^3d^4 + 4c^2d).$$

Question 4

Multiply out the brackets and simplify the expression

$$(3x + 4)(2x - 5).$$

Question 5

Solve the equation

$$3 + \frac{2x - 3}{x} = 9.$$

Question 6

Factorise the expression

$$x^2 - 2x - 8.$$

Question 7

Solve the equation

$$3x^2 - 4x - 2 = 0.$$

Give your answers to three decimal places.

Question 8

Find the equation of the straight line that passes through the points $(5, -1)$ and $(-1, 3)$.

Question 9

Write the expression

$$\frac{x - 2}{3} + \frac{2x + 5}{4}$$

as a single fraction in its simplest form.

Question 10

Simplify the expression

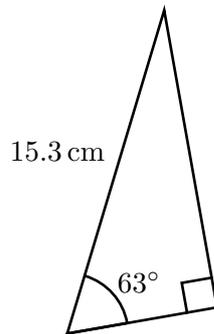$$\frac{p^{\frac{7}{2}} p^{\frac{3}{4}}}{p^{\frac{5}{4}}}.$$

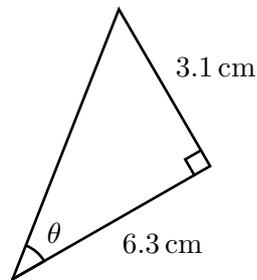**Question 11**

Simplify the expression

$$\left(\frac{14x^5}{15y^{-2}}\right) / \left(\frac{2x^{-2}}{5y^3}\right).$$

Question 12

Calculate the length of the shortest side of the triangle shown below. Give your answer in centimetres to two significant figures.

Question 13

Calculate the size of the angle θ in the triangle below. Give your answer in degrees, to the nearest degree.
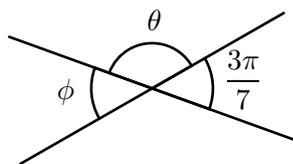

Question 14

The angle θ is such that $\sin \theta = 0.3$.

a) If θ is between $0°$ and $90°$, what is its value? Give your answer to the nearest degree.

b) If θ is between $90°$ and $180°$, what is its value? Give your answer to the nearest degree.

Question 15

What are the sizes, in radians, of the angles marked below?

Give your answers exactly, as multiples of π.

Question 16

The positive quantities A, B and C satisfy the equation

$$A = \left(\frac{B^2}{C^3} \right)^{\frac{1}{4}}.$$

Rearrange the equation to make B the subject.

Question 17

For what values of x is the following inequality true?

$$4x - 5 \leq 6x + 3$$

Question 18

Solve the simultaneous equations

$$5x - 3y = -7$$
$$3x - 2y = -9.$$

Question 19

Write the expression

$$\ln 4 - 2 \ln 5$$

as a single logarithm.

Question 20

Solve the equation

$$3^t = 15.$$

Give your answer to three significant figures.