UNITS 4 – 6

Miscellaneous Exercises

Notes

Starred* questions are for *Academic Route* only.

Diagrams are *not* drawn to scale.

1. This diagram is part of a map showing the position of three Nigerian towns. Kaduna is due north of Aba.
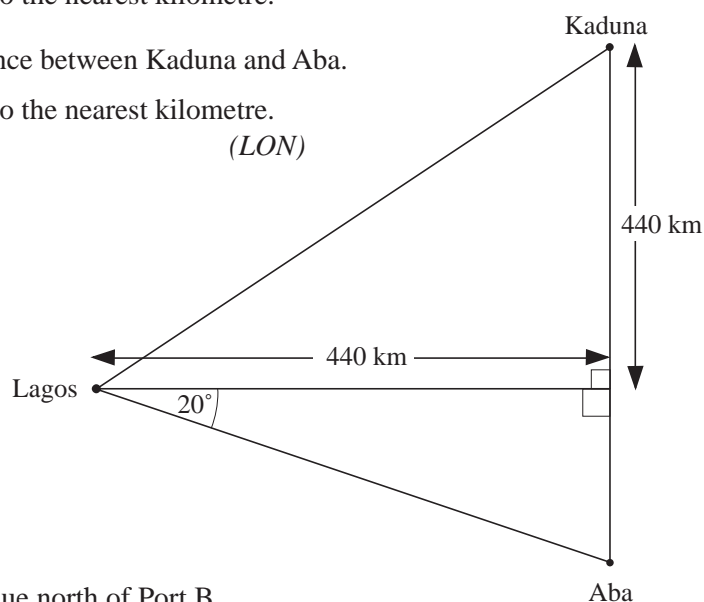
    (a) Calculate the direct distance between Lagos and Kaduna.

    Give your answer to the nearest kilometre.

    (b) Calculate the distance between Kaduna and Aba.

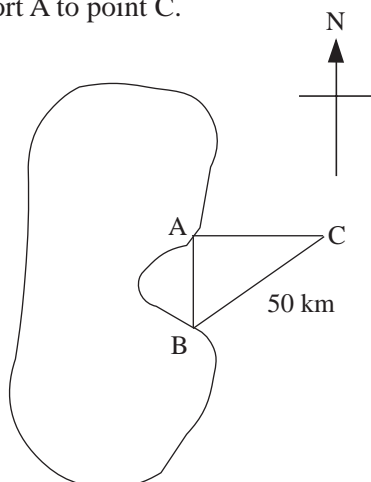   Give your answer to the nearest kilometre.

    (LON)

2. On this island, Port A is due north of Port B.

    A ship leaves Port B and travels on a bearing of $060°$ for 50 km.

    The ship is now due east of Port A at point C.

    Calculate the distance from Port A to point C.
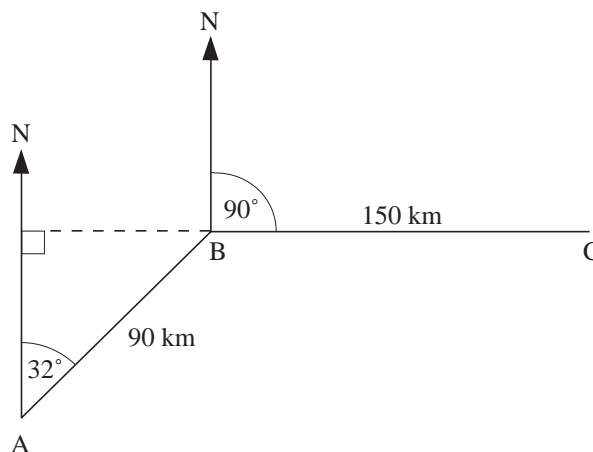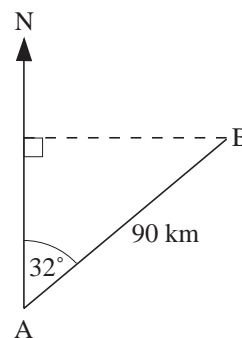

    (LON)

3. A ship sails on a two stage journey from A to B to C.

    The first stage of the journey from A to B is shown.

    A to B is a journey of 90 km on a bearing of 032°.

    (a) Calculate the distance travelled east during the first stage of this journey.

    The second stage of the journey from B to C is a distance 150 km on a bearing of 090°.

    (b) Find the total distance travelled east on the journey from A to C.

    Hence calculate the bearing of C from A.

    (SEG)

4. The table shows the results of a survey in a class.

Eye colour	Boys	Girls
Blue eyes	5	8
Green eyes	1	2
Brown eyes	19	12

    (a) What is the probability that one of the girls has blue eyes?

    (b) What is the probability that one of the students has brown eyes?

    (SEG)

5. Alistair has a fair spinner with five equal sectors.
    The spinner has three red sectors and two blue sectors.
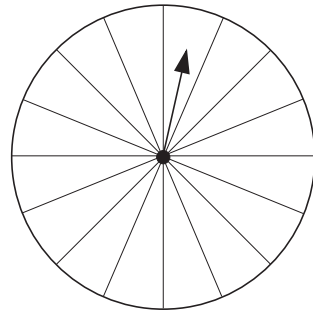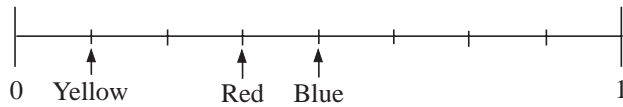
    (a) He spins it once.
         What is the probability that it lands on red?

    (b) He spins it twice.
         List all the possible outcomes.

    (c) The probability that both spins land on red is 0.36.
         What is the probability that both spins do *not* land on red?
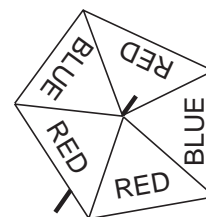
    (SEG)

6.

Probability Scale
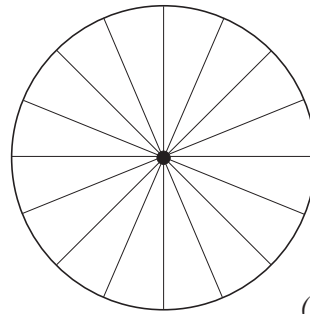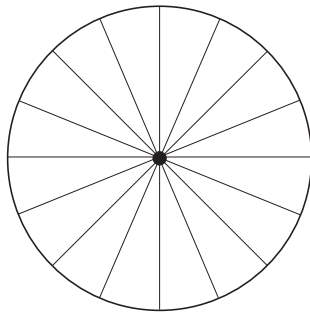
0　Yellow　　　　Red　Blue　　　　　　　1

In a game you spin an arrow. The arrow stops on one of sixteen equal sectors of a circle. Each sector of the circle is coloured. The probability scale shows how likely it should be for the arrow to stop on any one colour.

Copy and shade these circles to show how many sectors should be

(a)　coloured red,　　　　　　　　(b)　coloured blue.

(LON)

7.　A game in an amusement arcade can show the following pictures.

The fraction under each picture shows the probability of the picture being shown at the first window.

Cherry　　　Bar　　Banana　Strawberry　Apple
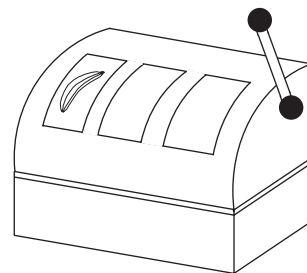
BAR

$\dfrac{4}{12}$　　$\dfrac{1}{12}$　　$\dfrac{2}{12}$　　$\dfrac{2}{12}$　　$\dfrac{3}{12}$

Calculate the probability of the game

(a)　*not* showing a Bar at the first window,

(b)　showing a cherry or an apple at the first window.

(LON)

*   8.   Peter and Asif are both taking their driving test for a motor cycle for the first time.

The table below gives the probabilities that they will pass the test at the first attempt.

	Probability of passing at first attempt
Peter	0.6
Asif	0.7

(a)   Write down the probability that Asif will pass the test at the first attempt.

(b)   Work out the probability that Peter will fail the test at the first attempt.

(c)   Explain clearly why Asif is more likely to pass the test at the first attempt than he is to fail at the first attempt.

On a particular day 1000 people will take the test for the first time.

For each person the probability that they will pass the test at the first attempt is the same as the probability that Asif will pass the test at the first attempt.

(d)   Work out an estimate for how many of these 1000 people are likely to pass the test at the first attempt.

(e)   Calculate the probability that both Peter and Asif will pass the test at the first attempt.

(f)   Calculate the probability that Peter will pass the test at the first attempt and Asif will fail the test at the first attempt.

(LON)

9.   Tickets for a concert cost £3 each.

Ramana has £17.

Work out the greatest number of tickets that Ramana can buy.

(LON)

10.   Tickets for a football match cost £4.70 each.

(a)   How much will 100 tickets cost?

Children can buy tickets at half price.

Mr and Mrs Smith and their two children buy tickets.

(b)   Work out the total cost of the tickets.

(LON)

11.   Miss Phillips is organising a trip to London to see the musical 'Cats'.

195 people decide to go on the trip.

For every 16 tickets that she pays for Miss Phillips is given a free seat.

(a)   *Without using a calculator* and showing *all* your working, work out how many free seats Miss Phillips will be allowed.

Miss Phillips charges *each person* £27 to cover the cost of the tickets and the coach fare.

(b)   Work out the total amount of money that should be collected.

The total cost of the trip was £5000.

(c)   Work out the profit that Miss Phillips will make on the trip.

(d)   Express the profit as a percentage of the total cost of the trip.

(LON)

12.   The summit of Mount Everest is at a height of 29 078 feet.

(a)   A climber is at a height of 28 198 feet.

Without using a calculator, calculate how far he is below the summit.

You *must* show all your working.

(b)   What is the height of Mount Everest to the nearest ten feet?

(c)   In a newspaper report the height of Mount Everest is given as 30 3000 feet. To what accuracy has the height been given?

(SEG)

13.   In this question you *must* use your calculator and you *may* write down any stage in your calculation.

Evaluate $\dfrac{(23.4 + 35.6) \times 5.7}{200.3 \times (16.2 - 8.15)}$

(LON)

*   14.   The diameter of an atom is 0.000 000 03 m.

(a)   Write 0.000 000 03 in standard form.

Using the most powerful microscope, the smallest objects which can be seen have diameters which are *one hundredth* of the diameter of an atom.

(b)   Calculate the diameter, in metres, of the smallest objects which can be seen using this microscope.

Give your answer in standard form.

(LON)

15. (a) Calculate the value of 2×5^9.

    (b) (i) Calculate $\dfrac{28.3 + \sqrt{0.512}}{(18.9 - 2.75)^2}$

        (ii) Paul gives his answer to (i) correct to 5 significant figures.

   Give one reason why this is *not* an appropriate degree of accuracy.

           (SEG)

16. (a) Use the formula $v = \sqrt{u^2 + 2as}$ to find the value of v when $u = 24$, $a = -9.8$ and $s = 10\frac{1}{4}$.

    (b) *Without using a calculator*, use approximation to check that your answer to (a) is of the correct order of magnitude.

        You *must* show all your working.

        (SEG)

* 17. The winner of a 100 m running race is times at 11.2 seconds by a hand-held stopwatch and 11.20 seconds by an electronic timing device. Explain, with appropriate working, why these timings are different.

    (SEG)

* 18. The volume of a square-based block is given by $V = a^2 h$.

    (a) In an experiment, the length a, and height, h, are measured as 4 cm and 11 cm respectively, each measured to the nearest cm.

        What are the maximum and minimum possible vales of V in cm³?
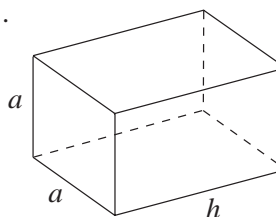
    (b) In another experiment, the volume of the block is found to be 350 cm³, measured to the nearest 50 cm³, and its height is measured as 13.5 cm, to the nearest 0.5 cm.

        (i) What are the maximum and minimum possible values of the length, a, in centimetres?

        (ii) How many significant figures should be used to give a reliable answer for the value of a?

        (SEG)