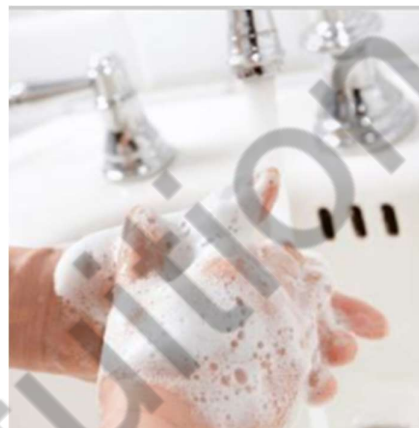


English – Section One

Wash Up!

Whether it's a sign in the restroom at work or the nagging voice of parents, most of us are reminded several times each day to wash our hands. Though the benefits of hand-washing are obvious—the most important being protection from disease-causing bacteria and viruses—very few people understand the scientific principles that underlie the way hand-washing works. The chemistry can, indeed, be quite complex, but the principles behind this mundane task start with a premise that almost everyone understands: oil and water don't mix.



Most chemical compounds fall into one of two categories: Hydrophilic and hydrophobic. Hydrophilic, or water-loving, compounds can dissolve in water, while hydrophobic, or Water-fearing, compounds such as oils do not dissolve in water. Hydrophilic and hydrophobic substances cannot dissolve into one another, hence the saying, "oil and water don't mix." Human skin and hair secrete oils that trap dirt, bacteria, and other undesirable substances close to the body, where it can be accidentally inhaled or swallowed. Washing your skin and hair with ordinary water will not dissolve these oils, so whatever is trapped in them remains stuck in place.

Soap is special in that it is, strictly speaking, neither hydrophilic nor hydrophobic. Instead, it is an emulsifier; it can help hydrophilic and hydrophobic substances dissolve into one another. How does soap accomplish this task? The answer lies in soap's unique molecular structure. The soap molecule contains two parts: a carboxylate group and a long hydrocarbon chain. The carboxylate group is hydrophilic, or water-loving, and can interact with water through hydrogen bonding. The hydrocarbon chain, however, is hydrophobic, and can break up oil molecules, causing them to dissolve. So, when you wash your hands, the soap's hydrocarbon chains dissolve the oils that exist naturally on your skin and hair, freeing the dirt and germs that the oils have trapped. Then, the soap's hydrophilic carboxylate group allows the whole mess—water, the oils on your skin, and the germs the oils have trapped there—to wash safely down the drain.

This is the process by which traditional soap works, but anti-bacterial soap operates in a different way. Bacteria are living organisms, and anti-bacterial soaps contain a chemical additive—usually Triclosan—that disrupts the biological operations of bacteria they come into contact with, causing the bacteria to die. Health experts disagree, however, about the benefits of anti-bacterial soap. First of all, not all bacteria are virulent, and anti-bacterial soaps kill both good and bad bacteria. Humans need contact with certain good bacteria to survive and remain healthy. In addition, many diseases are caused not by bacteria, but by viruses that are not killed by anti-bacterial soaps. Finally, most anti-bacterial chemicals like Triclosan need up to two minutes of direct contact with bacteria in order to kill it. Most people do not leave the solution on their hands this long, in which case it will not have the desired effect.

While it is not necessary to know exactly how soaps work to appreciate their benefits, it can be fascinating to consider the complex chemical reactions that are taking place each time you wash your hands.

- 1) Paragraph 1 can best be described as a(n)
- A. map introduction, in which the author puts forth a claim, and then summarizes the major points behind that argument
 - B. background introduction, in which the author gives important information the reader needs to know about the topic
 - C. question introduction, in which the author poses a question that he or she will answer in the main part of the passage
 - D. personal introduction, in which the author explains how he or she relates to the topic
 - E. anecdotal introduction, in which the author relates the topic to everyday life in order to get the audience interested
- 2) At the end of paragraph 1, the author writes, “oil and water don’t mix.” Which of the following sentences from the passage best outlines the scientific explanation behind this expression?
- A. “Instead, it [soap] is an emulsifier; it can help hydrophilic and hydrophobic substances dissolve into one another.”
 - B. “Hydrophilic, or water-loving, compounds can dissolve in water, while hydrophobic, or waterfearing, compounds such as oils do not dissolve in water.”
 - C. “Bacteria are living organisms, and anti-bacterial soaps contain a chemical additive—usually Triclosan—that disrupts the biological operations of bacteria they come into contact with, causing the bacteria to die.”
 - D. “Human skin and hair secrete oils that trap dirt, bacteria, and other undesirable substances close to the body, where it can be accidentally inhaled or swallowed.”
 - E. “The soap molecule contains two parts: a carboxylate group and a long hydrocarbon chain.”
- 3) Which of the following statements does NOT describe one of soap’s unique chemical properties?
- A. It is an emulsifier.
 - B. Its molecules contain a hydrocarbon chain.
 - C. It disrupts the biological operations of bacteria.
 - D. Its molecules contain a carboxylate group.
 - E. It is neither hydrophilic nor hydrophobic
- 4) As used in paragraph 4, which is the best synonym for **virulent**?
- A. water-loving
 - B. water-hating
 - C. disgusting
 - D. alive
 - E. harmful

- 5) How long does most anti-bacterial soap need to have direct contact with bacteria to be effective?
- A. 5 seconds.
 - B. 30 seconds.
 - C. 1 minute.
 - D. 2 minutes.
- 6) Which of the following subtitles would be most appropriate for this passage?
- A. Soap Through the Ages: A Brief History of Clean
 - B. The Many Forms and Uses of Soap
 - C. The Science Behind Soap's Cleaning Power
 - D. The Fall of Anti-bacterial Soap
 - E. Why Oil and Water Don't Mix
- 7) The author likely writes about anti-bacterial soaps in paragraph 4 to
- A. explain that some types of soap work differently
 - B. prove to the reader that he or she knows about many different types of soaps
 - C. warn readers about the dangers of inferior soaps
 - D. inform readers about the new and improved, "next generation" of soaps
 - E. establish that viruses are more dangerous than bacteria
- 8) How does soap help in dissolving oils and removing dirt and germs from the skin?
- A. Soap is hydrophobic and dissolves oils.
 - B. Soap contains a hydrophilic carboxylate group.
 - C. Soap interacts with water through hydrogen bonding.
 - D. Soap contains both hydrophilic and hydrophobic components.
- 9) What is the primary reason for washing hands according to the passage?
- A. To maintain skin and hair hygiene
 - B. To dissolve oils on the skin and hair
 - C. To eliminate bacteria and viruses
 - D. To maintain good contact with good bacteria
- 10) What is the main difference between traditional soap and anti-bacterial soap?
- A. Traditional soap dissolves oils, while anti-bacterial soap kills bacteria.
 - B. Traditional soap is hydrophobic, while anti-bacterial soap is hydrophilic.
 - C. Traditional soap is more effective against viruses.
 - D. Anti-bacterial soap contains Triclosan as an emulsifier

English – Section Two (Part A)

The Wild Swans at Coole*

The trees are in their autumn beauty,
The woodland paths are dry,
Under the October twilight the water
Mirrors a still sky;
Upon the brimming water among the stones
Are nine-and-fifty swans.

The nineteenth autumn has come upon me
Since I first made my count;
I saw, before I had well finished,
All suddenly mount
And scatter wheeling in great broken rings
Upon their clamorous* wings.

I have looked upon those brilliant creatures,
And now my heart is sore.
All's changed since I, hearing at twilight,
The first time on this shore,
The bell-beat of their wings above my head,
Trode with a lighter tread.

Unwearied still, lover by lover,
They paddle in the cold
Companionable streams or climb the air;
Their hearts have not grown old;
Passion or conquest, wander where they will,
Attend upon them still.

But now they drift on the still water,
Mysterious, beautiful;
Among what rushes will they build,
By what lake's edge or pool
Delight men's eyes when I awake some day
To find they have flown away?

W. B. Yeats

Read the poem carefully, at least twice.

1. In 'The Wild Swans at Coole,' how does the poet present his feelings about the swans in this poem?
(You are advised to write one paragraph but no more than half a side of A4 for your answer.)
2. The poem mentions "nine-and-fifty swans" in the brimming water. What do you think is the significance of this specific number, and what might it symbolize?
(You are advised to write one paragraph but no more than a quarter of a side of A4 for your answer.)
3. How does the poet's perception of the swans change over time, as described in the poem? What do the swans symbolize for the poet?
(You are advised to write one paragraph but no more than a quarter of a side of A4 for your answer.)

English – Section Two (Part B)

Imagine you're a chef that works in a popular restaurant, you've been asked to write an article about your experiences working in the profession.

Include the following in your article:

- The busiest night in the restaurant's history.
- A unique and challenging dish you're tasked with preparing.
- The satisfaction and exhaustion you feel at the end of the shift.

You may write this as a short story or an account of your experiences

You can plan your work in any way that you find helpful (spidergram/brainstorm/bullet points) before you start writing.

Remember to check and correct your work before the end of the test.

(You are advised to write in pen at least two paragraphs but no more than one side of A4 for your answer.)

Maths Practice

- 1 Write the following numbers in order of size.
Start with the smallest number.

0.32 0.4 0.35 0.309

Answer: _____

- 2 Here is a list of numbers.

5 11 18 22 29

From the list, write down a multiple of 3

Answer: _____

- 3 Write 4.666 correct to the nearest whole number.

Answer: _____

- 4 Write $\frac{3}{4}$ as a decimal.

Answer: _____

- 5 Write down the value of the 7 in the number 8765

Answer: _____

6. Arrange these numbers in increasing order of size.

$$\frac{51}{80}$$

$$\frac{25}{31}$$

$$\frac{88}{110}$$

$$\frac{61}{65}$$

$$\frac{9}{13}$$

Smallest

Largest

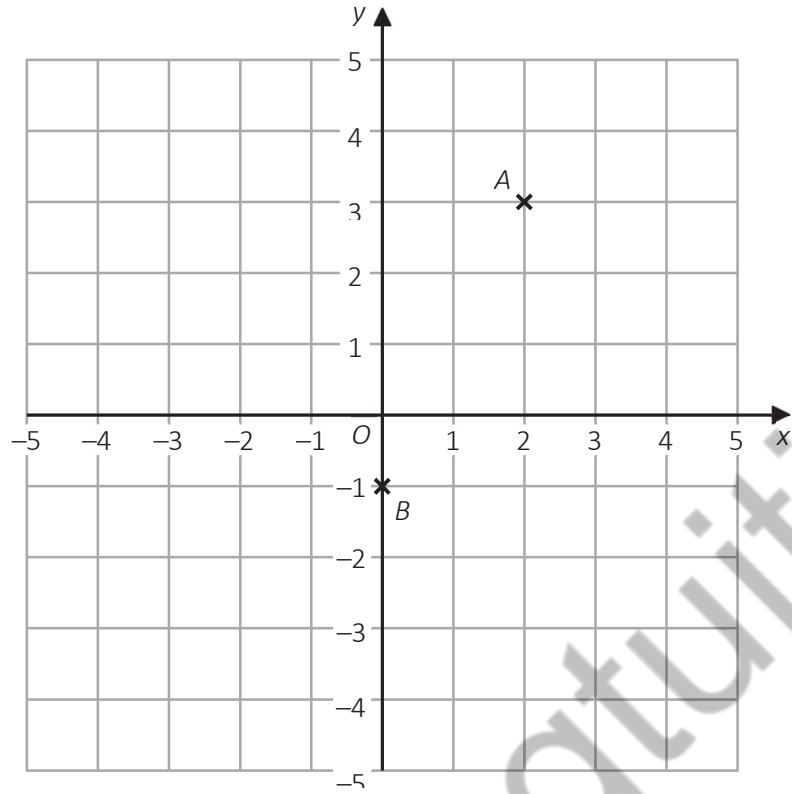
Answer: _____

7. An equilateral triangle is placed in a square.
The square has an area of 36 cm^2 ?

What is the perimeter of the triangle?



Answer: _____ cm



(a) Write down the coordinates of the point A .

Answer: (.....,.....)

(b) Write down the coordinates of the point B .

Answer: (.....,.....)

(c) On the grid, mark with a cross (X) the point $(-2, 1)$
Label this point C .

Answer:

- 9 (a) A bag contains red counters and blue counters only.

$$\text{number of red counters} : \text{number of blue counters} = 3 : 4$$

Write down the fraction of the counters that are red.

Answer: _____

- (b) Write the ratio 12 : 30 in the form 1 : n

Answer: _____

- 10 Jenny has 12 marbles.

$\frac{1}{4}$ of these 12 marbles are large.

The rest of these 12 marbles are small.

Each large marble has a weight of 70 grams.

Each small marble has a weight of 50 grams.

Work out the total weight of the 12 marbles.

Answer: _____

11. Oreo, the puppy, weighed 3000g when born.

Oreo lost one-tenth of his body weight in the first week, but then gained two-seventh of her new weight during the second week and a further 500g during the third week.

How much did Oreo weigh at the end of the third week?

Answer: _____ g

12 The diagram shows a number machine.



(a) Find the output when the input is 7

Answer: _____

(b) Find the input when the output is 41

Answer: _____

13. Ali, Ben and Cathy share an amount of money in the ratio 6 : 9 : 10

What fraction of the money does Ben get?

Answer: _____

14 Ishmael asked 30 students at college to tell him the sport they each like the best from cricket or tennis or swimming.

11 of the 20 female students said swimming.

2 of the male students said tennis.

5 students said cricket.

The number of male students who said cricket was the same as the number of male students who said swimming.

Complete the two-way table.

	Cricket	Tennis	Swimming	Total
Male students				
Female students				20
Total				30

15 Jamil makes a drink by mixing

1 part of orange squash with 9 parts of water.

He uses 750 millilitres of orange squash.

Jamil is going to put the drink he has mixed into 1 litre bottles.

Work out the greatest number of 1 litre bottles that Jamil can completely fill.

Answer: _____

16. It takes 6 minutes to cut through the cross section of a log
What fraction of one hour, in its simplest form, does it take for the log to be cut up into 12 equal pieces?

Answer: _____

- 17 In a shop, a TV has a normal price of £500
The shop has a sale.

On Monday, the normal price of the TV is reduced by $\frac{1}{10}$ to give the sale price.

On Tuesday, the sale price of the TV is reduced by 20%

Chris wants to buy the TV.

He has £400 to spend on the TV.

Does Chris have enough money to buy the TV on Tuesday?

You must show how you get your answer.

Answer: _____

18 The table shows information about the numbers of points scored by 30 students in a quiz.

Number of points	Frequency
0	4
1	3
2	7
3	5
4	6
5	5

(a) Find the modal number of points.

Answer: _____

(b) Work out the total number of points scored.

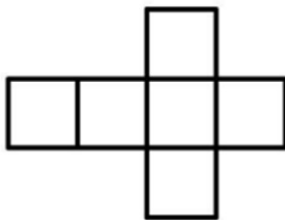
Answer: _____

19. The ratio of goals scored during a 60-minute netball match between team A and team B was 4:1.

If goals were scored at a rate of 1 goal every 10 minutes, what was the final score?

Answer: _____

20. The net makes a cube.



When the cube is made up, it has a volume of 216 cm^3

(a) What is the perimeter of the net?

Answer: _____

(b) What is the area of the net?

Answer: _____

(c) If the length of each edge of the cube is tripled, how many times will the volume of the cube be?

Answer: _____

21. Bill has 400 counters in a bag.

He gives

35 of the counters to Sameena

50 of the counters to Henry

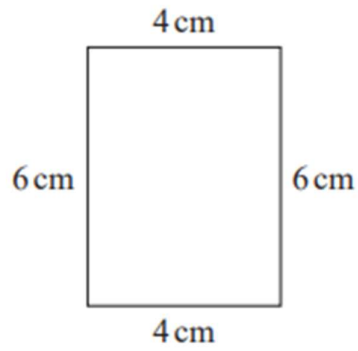
75 of the counters to Lucas

What fraction of the 400 counters is left in Bill's bag?

Give your fraction in its simplest form.

Answer: _____

22. Here is a rectangle.



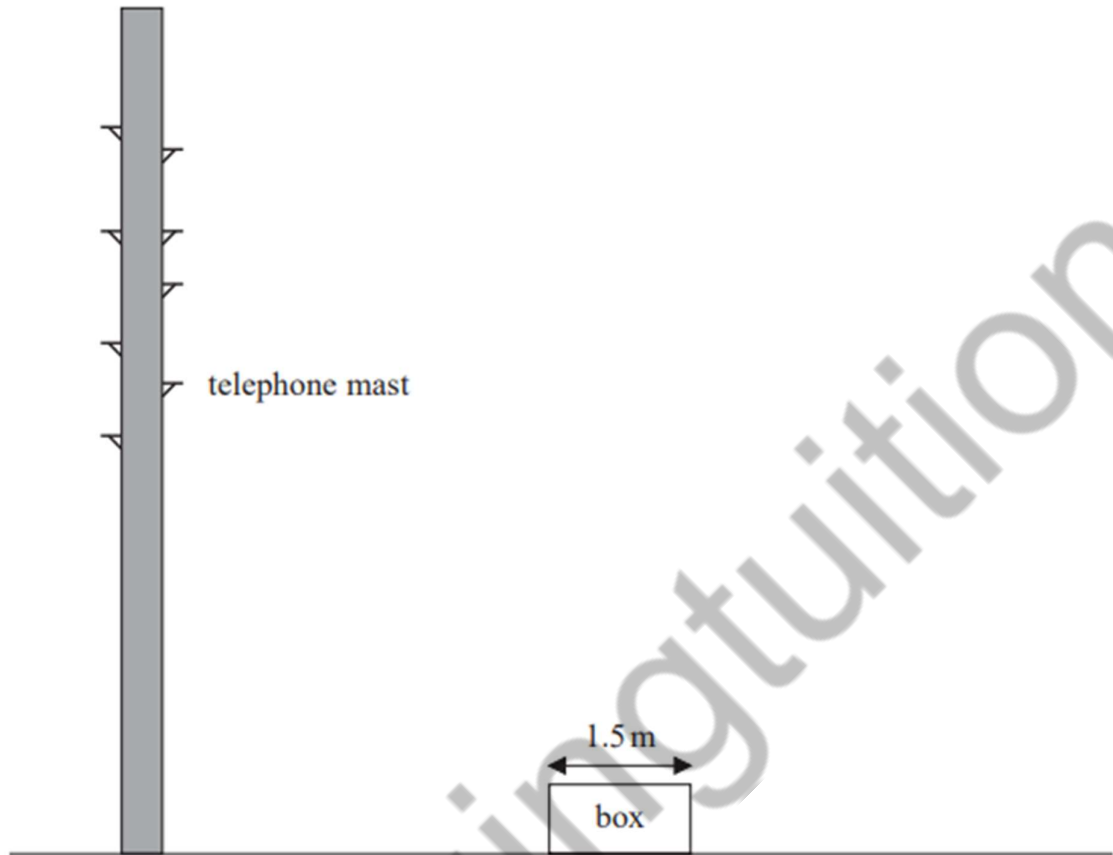
The 6-sided shape below is made from two of these rectangles.



Work out the perimeter of this 6-sided shape.

Answer: _____ cm

23. The accurate scale diagram shows a telephone mast and a box.



The box has a real width of 1.5 metres.

Find an estimate for the real height, in metres, of the telephone mast.

Answer: _____ m

24 Sean pays £10 for 24 chocolate bars.

He sells all 24 chocolate bars for 50p each.

Work out Sean's percentage profit.

Answer: _____

25. Write down the next number in each of the following sequences:

(a) 12 15 20 23 _____

(b) 729 1000 1331 1728 _____

(c) 3 16 46 136 _____

26. A shop sells packs of black pens, packs of red pens and packs of green pens.

There are

2 pens in each pack of black pens

5 pens in each pack of red pens

6 pens in each pack of green pens

On Monday,

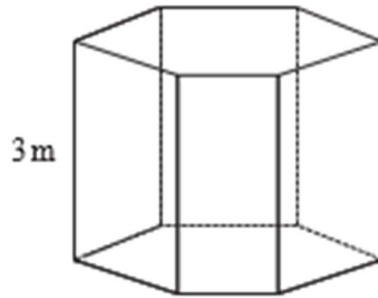
number of packs of black pens sold : number of packs of red pens sold : number of packs of green pens sold = 7 : 3 : 4

A total of 212 pens were sold.

Work out the number of green pens sold.

Answer: _____

27 The diagram shows a prism placed on a horizontal floor.



$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

The prism has height 3 m

The volume of the prism is 18 m^3

The pressure on the floor due to the prism is 75 newtons/m^2

Work out the force exerted by the prism on the floor.

..... newtons

28 Write these numbers in order of size.

Start with the smallest number.

6.72×10^5

67.2×10^{-4}

672×10^4

$0.000\ 672$

Answer: _____

29. Liz goes on holiday to South Africa.

Liz wants to change £850 into South African rand.
She wants to get as many 200 rand notes as possible.

The exchange rate is £1 = 18.53 rand.

Work out the greatest number of 200 rand notes that Liz can get for £850

Answer: _____

30. Deon needs 50 g of sugar to make 15 biscuits.

She also needs

three times as much flour as sugar
two times as much butter as sugar

Deon is going to make 60 biscuits.

(a) Work out the amount of flour she needs.

Answer: _____