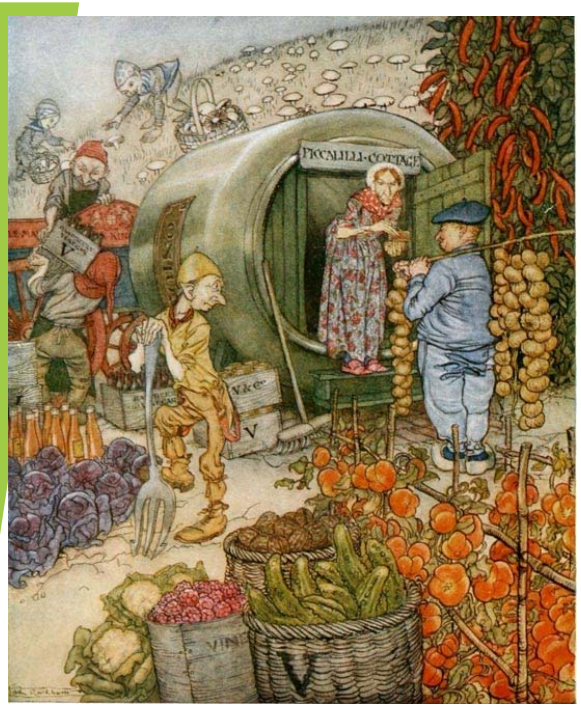
THE BEWDLEY SCHOOL

Learning for Life - Achievement for All

# Year 7

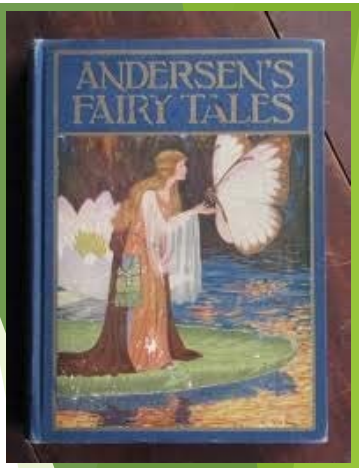
## Work Booklet

This workbook contains English, Maths and Science Resources



# Telling Stories

# Starter Task: Story Soup

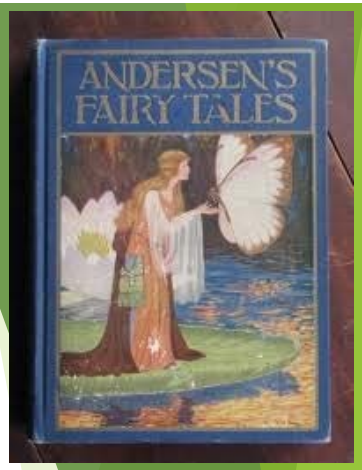



What are the ingredients that traditional tales or ‘fairy stories’ often contain?

List all of the elements that you think a fairy story contains.

Think about themes, characters, symbols, plots and patterns.

# Task 1: Tell me a story…



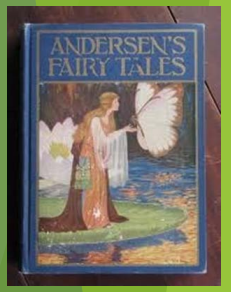

- If you are at home with other people you can do this as a task

Together but you may wish to do it individually.

- Your job is to tell a version of a fairy story as well as you can.
- Tell the story out loud, without referring to a copy in a book and see if you can keep the story flowing.
- Can you tell the whole story?
- Is the story memorable?
- What elements of the story do you remember most?
- See if you can find a version of the story to read online, on a bookshelf

or in "Grimms Tales" - http://www.gutenberg.org/files/2591/2591-h/2591-h.htm#link2H_4_0023

# Task 2:  Are you still hooked?




## Now think about the following questions:

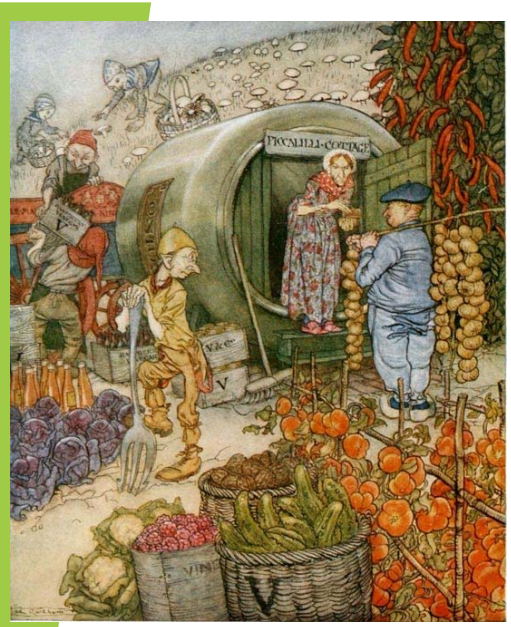
Did your version of the story differ to how someone else in your house-hold remembered it?

Why might there have been these differences

Why do you think these sorts of tales were not written down to begin with?

What do you think their purpose was, as well as to entertain?

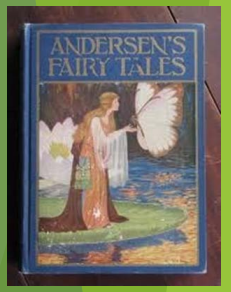
Can you think of a modern retelling of your story?  Is it in a book or on film



# Learning Objective:

To understand the importance of ‘the interruptive event’ in storytelling.

# Task 3:  The Interruptive Event



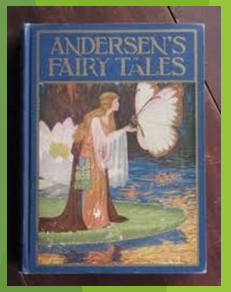

In many fairy stories or traditional stories there is an interruptive event.

This is an event where a character faces something that means the action of the story changes because of something unexpected happening, or because of a decision that they have made.

There are often a number of interruptive events in one tale.

Sometimes interruptive events carry a moral message too.

# Task 4: The Interruptive Event




Can you think of any in the fairy story that you have been considering?

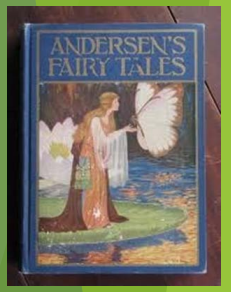
Write an example down.

Begin your work using phrases similar to these: "A good example of an interruptive event is when…in 'title' because…"

Extension: Do you think that there is a moral message behind the fairy story? Is it linked to the interruptive event? Extend your writing to comment on this.

3 minutes

# Task 5: The Interruptive Event Image




Find or draw an image of your interruptive event. Imagine that it is going to appear in the printed version of the story book.

What caption would you include?

The caption could be words spoken by one of the characters or a phrase which you think encapsulates the action. Write the caption under the picture.

Thinker: The caption briefly explains what is in the image.

Tough Thinker: The caption also hints at something else too (the message/plot).

Super Tough Thinker: The caption is written so that it does something clever in terms of style (rhyme, literacy device, speech)

Look at some of the examples below to inform your thinking.

# LITTLE RED RIDING-HOOD IN THE WOOD

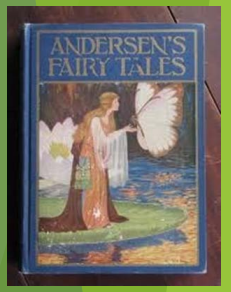
THE WOLF BOUNDED UP TO RED RIDING-HOOD AS SHE GATHERED THE DAISIES IN THE WOOD
Little Red Riding-Hood found the flowers so beautiful that she stopped on her way through the wood to pick them. Soon it began to grow dark, and as she picked up her basket to go there bounded up to her a great wolf.


Out set Riding Hood, so obliging and sweet,
And she met a great Wolf in the wood,
Who began most politely the maiden to greet,
In as tender a voice as he could.

He asked to what house she was going and why;
Red Riding Hood answered him all;
He said, “Give my love to your Gran; I will try
At my earliest leisure to call.”


Away skipped my lady as gay as you please
In a world full of sunshine and roses and bees.
Alas! she forgot her Mother's wise warning
For she paused to pick flowers on that glorious morning.

# The Interruptive Event from “Name of Your Traditional Tale”



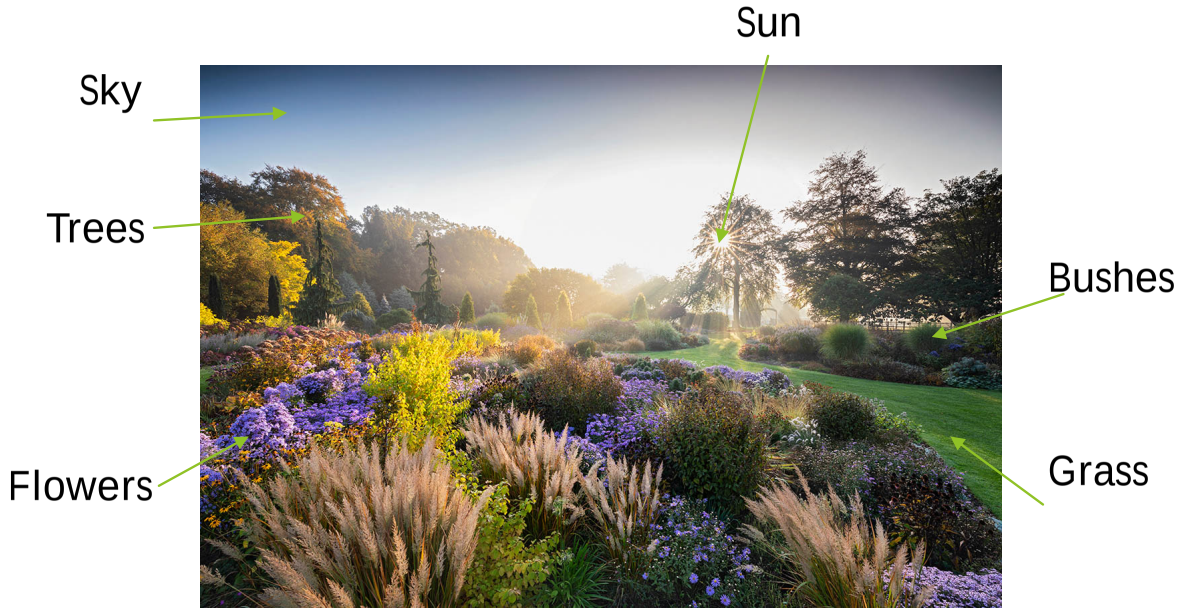

Now use descriptive language to describe that moment in the story,

as if you were looking at the scene in front of you. Write a description of the moment that you have pictured in as much detail as possible so that a reader could imagine the scene without seeing it.

Let’s practise first by writing a different description. Follow the next sequence of slides to help you.

You are going to write a description of this picture. Work through the slides to create a description to be proud of.

# Annotate the picture with **everything** you can see.



Once you have done this, draw an arrow coming away from each feature you have identified, and write **3 adjectives** that could be used to describe it.

Draw another arrow coming from each list of 3 adjectives, and annotate **2 verbs** that you could use in a sentence with the identified adjectives.

Sun

Radiant
Bright
Lustrous

Beaming
Shining

# Sentence starters

- Starting with an adverb:
  - Slowly, the sun began to rise across the garden…
- Starting with an adjective:
  - Lustrous light beams from the sun…
- Starting with a list:
  - Purples, yellows, and greens fill the garden with vibrancy…
- Starting with a question:
  - Wondering where this mystical place is?…
- Starting with a verb:
  - Beaming light gives the garden an enchanted atmosphere…

Draw a final arrow coming away from each set of verbs. **Write 2 sentences** for each feature you identified. Use the verbs and adjectives that you have chosen.

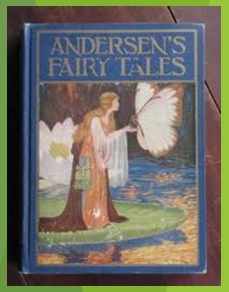
Sun → Radiant, Bright, Lustrous → Beaming, Shining

Lustrous light beams from the sun, across the radiant garden below it.

Shining brightly, the sun illuminates the azure sky.

# Write a description based on the image below:

- Begin writing the opening paragraph answering this descriptive question.
- Use the method of your preference- linking or circular.
- You must:
  - Vary your sentence starters.
  - Use ambitious vocabulary- you can google or use a thesaurus to find a more ambitious word for basic adjectives and verbs.

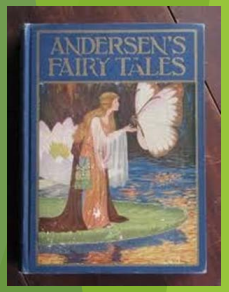



# LO: To write a creative ending for an existing fairy story

## Starter Task – Interruptive Recap

Take the tale that you were asked to bullet point the plot for and remind yourself what the interruptive event is.

# Task 2– Getting Inspired




Let's read a famous reworking together:

Roald Dahl's "Little Red Riding Hood and the Wolf"

What do you notice about the story?

How is it written?

What is different to the 'original', what stays the same?

# Little Red Riding Hood and the Wolf

As soon as Wolf began to feel
That he would like a decent meal,
He went and knocked on Grandma's door.
When Grandma opened it, she saw
The sharp white teeth, the horrid grin,
And Wolfie said, 'May I come in?'
Poor Grandmamma was terrified,
'He's going to eat me up!' she cried.
And she was absolutely right.
He ate her up in one big bite.
But Grandmamma was small and tough,
And Wolfie wailed, 'That's not enough!
'I haven't yet begun to feel
'That I have had a decent meal!'
He ran around the kitchen yelping,
'I've *got* to have another helping!'
Then added with a frightful leer,
'I'm therefore going to wait right here
'Till Little Miss Red Riding Hood
'Comes home from walking in the wood.'
He quickly put on Grandma's clothes,
(Of course he hadn't eaten those.)

He dressed himself in coat and hat.
He put on shoes and after that
He even brushed and curled his hair,
Then sat himself in Grandma's chair.
In came the little girl in red.
She stopped. She stared. And then she said,

'*What great big ears you have, Grandma.*'
'*All the better to hear you with,*' the Wolf replied.
'*What great big eyes you have, Grandma,*'
said Little Red Riding Hood.
'*All the better to see you with,*' the Wolf replied.

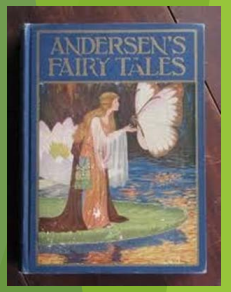
He sat there watching her and smiled.
He thought, I'm going to eat this child.
Compared with her old Grandmamma
She's going to taste like caviare.

Then Little Red Riding Hood said, '*But Grandma, what a lovely great big furry coat you have on.*'



'That's wrong!' cried Wolf. 'Have you forgot
'To tell me what BIG TEETH I've got?
'Ah well, no matter what you say,
'I'm going to eat you anyway.'
The small girl smiles. One eyelid flickers.
She whips a pistol from her knickers.
She aims it at the creature's head
And *bang bang bang*, she shoots him dead.
A few weeks later, in the wood,
I came across Miss Riding Hood.
But what a change! No cloak of red,
No silly hood upon her head.
She said, 'Hello, and do please note
'My lovely furry WOLFSKIN COAT.'

# Task 3– Creative Planning

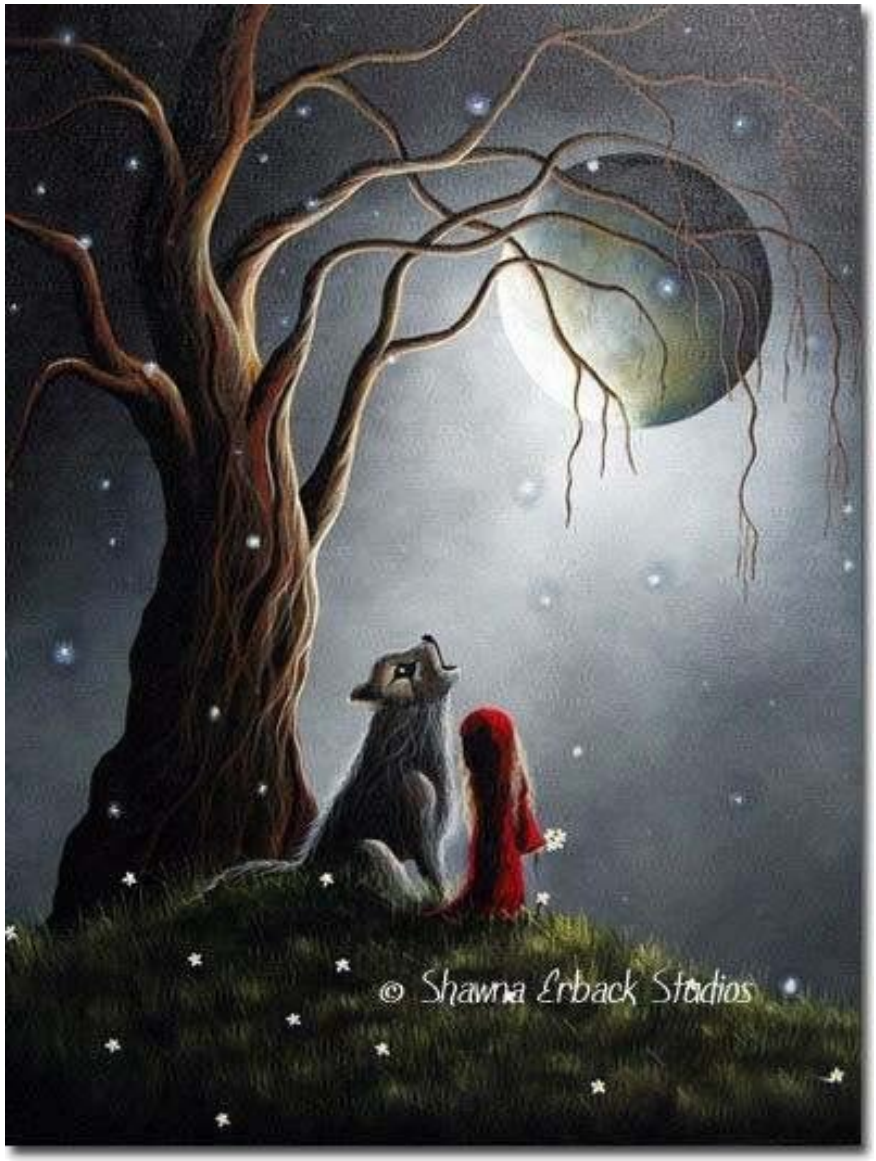



Draw up a plan for the ending to your fairy story from the point of the interruptive event.

It must include some of the same characters and have elements of the original tale.

You can put your own interpretation into the tale though. The following pictures might give you some ideas.

Can you rework the message?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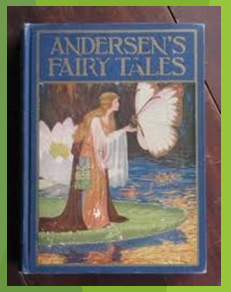
# Today's Task :  Story Ending Writing Assessment




Now use your plan to write the ending for your story, from the interruptive event.

Think about:

How you will tell your story – will you use prose or poetry to tell your story?

Using descriptive language and writers' devices.

Using punctuation correctly.

Whether you want to include any direct speech.

How you are changing the story to ask the reader to consider a different perspective.

# Maths – Using a calculator. Trial & improvement

**Section A**

**Question 1**

Use your calculator to work out

$$\sqrt{12.63+18^2}$$

Write down all the figures on your calculator display.

.....

**Question 2**

Use your calculator to work out

$5.2+\sqrt{7.84}$

.....

**Question 3**

Mr Shah is working out the cost of the electricity he used in April.

| Electricity Meter Readings | |
|---|---|
| 1 April | 79721 |
| 30 April | 80305 |

Mr Shah has to pay

21.3p for each of the first 70 units used in April

**and** 10.2p for each of all the other units used in April.

**Work out the total cost of the electricity he used in April.**

**(Total 3 marks)**

**Question 4**

Use your calculator to work out the value of $\frac{12.6^2 - 48.4}{0.23}$

**(2)**

Write down all the figures on your calculator display.

Give your answer as a decimal.

.....

**Question 5**

Calculate.

(a) $7{\cdot}2^2 - \sqrt{68.89}$

.....

[1]

(b) $\dfrac{5.6 \times 3.1}{4.5 - 0.23}$

Give your answer correct to one decimal place.

.....

[2]

**Question 6**

Calculate.

(a) $4{\cdot}8^2 - 0{\cdot}9 \times 1{\cdot}7$

.....

[1]

(b) $\dfrac{6.9 - 4.1}{2.8 - 1.75}$

Give your answer correct to one decimal place.

.....

[2]

**Section B**

**Question 7**

Use your calculator to work out

$$(3.4 + 2.1)^2 \times 5.7$$

Write down all the figures on your calculator display.

.....

**(2)**

**Question 8**

Use your calculator to work out $\dfrac{\sqrt{13.2 - 6.8}}{3.25 + 4.9}$

Give your answer as a decimal.

Write down all the figures on your calculator display.

.....

**(2)**

**Question 9**

Work out.

$$\frac{4.7 + 32.53}{12.08 \times 0.58}$$

Give your answer correct to 1 decimal place.

.....

[2]

**Question 10**

Calculate.

$$\frac{1789}{5.16 \times 0.72}$$

Give your answer correct to 2 decimal places.

.....

**Section C**
**Question 11**

The equation

$$x^3 + x = 37$$

has a solution between 3 and 4
Use a trial and improvement method to find this solution.
Give your answer correct to one decimal place.
You must show **ALL** your working.

$x =$ .....

**(4 marks)**

## Question 11

The equation

$$x^3 + 4x^2 = 100$$

has a solution between 3 and 4

Use a trial and improvement method to find this solution.

Give your answer correct to one decimal place.

You must show **ALL** your working.

$x =$ .....

**(Total 4 marks)**

**Question 13**

The equation $x^3 - 5x = 60$ has a solution between 4 and 5

Find this solution and give your answer correct to 1 decimal place.
You must show **all** your working.

$x =$ .....

**(total 4 marks)**

**Question 14**

The equation $x^3 - 3x = 23$ has a solution between 3 and 4

Find this solution and give your answer correct to 1 decimal place.

You must show all your working

*x* = .....

**(Total 4 marks)**

# Changing the subject, substituition and Using formulae in words

**Section A**

**Question 1**

Make *x* the subject of the formula

*8(x + y) = 2 + 3y*

……..

**(3 marks)**

**Question 2**

Make h the subject of the formula

$$\boldsymbol{t = \frac{gh}{10}}$$

……..

**(2 marks)**

**Question 3**

Make t the subject of the formula

s = 8t + 5

**…….**

**(2 marks)**

**Question 4**

Make m the subject of the formula

$$\boldsymbol{n = 6 + \frac{m}{2}}$$

**…….**

**(2 marks)**

**Question 5**

Rearrange $y = \frac{1}{2}x + 1$ to make $x$ the subject.

**…….**

**(2 marks)**

**Question 6**

Make $w$ the subject of the formula $p = \frac{3w + 20}{200}$

**…….**

**(3 marks)**

**Question 7**

Make $a$ the subject of the formula

$2(3a - c) = 5c + 1$

**……..**

**(3 marks)**

**Section B**

**Question 8**

$V = 3b + 2b^2$

(a) Find the value of $V$ when $b = -4$

**(2)**

.....

**Question 9**

$P = 3a + 2b^2$

(a) Find the value of $P$ when $a = 5$ and $b = -4$

**(2)**

.....

**Question 10**

Work out the value of $5t^2 - 7$ when $t = 4$

.....

**Question 11**

Work out the value of $b^2 + 2b$ when $b = -3$.

.....

[2]

**Question 12**

(a) Work out the value of $3x + 2$ when $x = -4$.

.....

[1]

(b) Work out the value of $2x^3 - 1$ when $x = 2$.

.....

[2]

**Question 13**

Work out the value of $x^2 + 3x$ when

(i) $x = 4$,

.....

[1]

(ii) $x = -5$.

.....

[2]

**Question 14**

Work out the value of $4x^2 + xy$ when $x = -3$ and $y = 2$.

.....

[2]

**Section C**

**Question 15**

Navjeet uses this rule to work out his pay.

| Pay = Number of hours worked × rate of pay per hour |
|---|

This week Navjeet worked for 10 hours.

His rate of pay per hour was £4.50

(a) Use this rule to work out his pay.

£……

**(2)**

Last week Navjeet's pay was £66
He worked for 12 hours.

(b) Work out Navjeet's rate of pay per hour last week.

£……

**(2)**

**(Total 4 marks)**

**Question 16**

John used this formula to work out his overtime pay.

| overtime pay = overtime rate × number of hours overtime worked |
|---|

John's overtime rate was £7.20 per hour.
He worked 8 hours overtime.

(a) Work out his overtime pay.

£ .....

**(2)**

John used this formula to work out his total pay.

| total pay = basic pay + overtime pay |
|---|

John's basic pay was £234

(b) Work out his total pay.

£ .....

**(1)**

**Question 17**

Erica and Luke use this rule to work out their pay.

| **Pay = number of hours worked × rate of pay per hour** |
|---|

Erica worked for 32 hours.
Her rate of pay per hour was £5.20

(a) What was Erica's pay?

**(2)**

£ .....

Luke's pay was £172.50
His rate of pay per hour was £5.75

(b) How many hours did Luke work?

**(2)**

..... hours

**(total 4 marks)**

**Question 18**

This formula is used to predict the adult height of a baby girl.

$$H = \frac{F + M - 12.5}{2}$$

$H$ = adult height of girl (cm)
$F$ = height of father (cm)
$M$ = height of mother (cm)

Karen and Keith have a baby girl.

They are interested in finding out how tall their baby girl is likely to grow.

Karen has a height of 156 cm.
Keith has a height of 172 cm.

(a) Use the formula to predict the adult height of their baby girl.
Show clearly how you get your answer.

**(2)**

# Expanding brackets, linear factorisation and linear inequalities

**Section A**

**Question 1**

Expand

$$2(3c - 2)$$

.....

**(1)**

**Question 2**

Expand $5(x + 2)$

.....

**(1)**

**Question 3**

Expand and simplify $4(2x + 5) + 2(3x - 2)$

.....

**(2)**

**Question 4**

Expand $3y(y + 4)$

.....

**(2)**

**Question 5**

Expand $2y(2y - 4)$

.....

**(2)**

**Question 6**

Expand $4(3a - 7)$

.....

**(2)**

**Question 7**

Expand and simplify $2(3y + 5)$

.....

**(2)**

**Question 8**

Multiply out $5(w + 6)$

.....

**(2)**

**Question 9**

Expand and simplify $4(x – 3) – 2(1 – x)$

.....

**(3)**

**Section B**

**Question 10**

Factorise

$$xy + 3x$$

.....

**(1)**

**Question 11**

Factorise $y^2 – 4y$

.....

**(1)**

**Question 12**

Factorise $x^2 + 6x$

……
**(Total 2 marks)**

**Question 13**

Factorise $3y + y^2$

.....
**(Total 1 marks)**

**Question 14**

Factorise $3y - 12$

.....
**(1)**

**Question 15**

Factorise $3x + 12$

……
**(1)**

**Question 16**

Factorise completely $6q + 12$

.....
**(Total 1 marks)**

**Question 17**

Factorise $x^2 - 4x$

.....

**(2)**

**Section C**

**Question 18**

(a) Solve $5x + 3 > 19$

.....

**(2)**

*n* is a whole number such that

$7 \leqslant 3n \leqslant 15$

(b) List all the possible values of *n*.

.....

**(3)**

**(Total 5 marks)**

**Question 19**

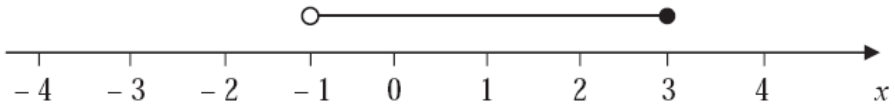
$-3 \leqslant n < 2$

$n$ is an integer.

(a) Write down all the possible values of $n$.

**(2)**

.....




(b) Write down the inequalities represented on the number line.

**(2)**

.....

**(total 4 marks)**

**Question 20**

Solve $3y - 2 \geqslant -8$

**(2)**

.....

**(total 2 marks)**

**Question 21**

Solve the inequality $3(2x + 1) > 10$

**(2)**

.....

**(total 2 marks)**

**Question 22**

Solve the inequality $2n - 1 < n + 3$

.....

**(total 2 marks)**

# Indices and linear graphs

**Section A**

**Question 1**

Simplify

(i) $x^4 \times x^3$

.....

**(1)**

(ii) $y^6 \div y^2$

.....

**(1)**

**Question 2**

Write as a power of 5

(i) $5^4 \times 5^2$

.....

**(1)**

**Question 3**

Simplify

(i) $x^4 \times x^3$

(ii) $y^6 \div y^2$

**(2)**

**Question 4**

Write as a power of 7

(i) $7^5 \times 7^3$

.....

(ii) $7^{10} \div 7^4$

.....

(iii) $\dfrac{7^5 \times 7^3}{7^{10} \div 7^4}$

.....

**(Total 3 marks)**

**Question 5**

a) Evaluate $2^4$ _____

b) Which is bigger and by how much? $2^5$ or $5^2$

_____ is bigger by _____

**(Total 3)**

**Question 6**

Write as a power of 4, $4^3 \times 4^2$ _____

Write as a power of 6, $6^5 \div 6^2$ _____

Simplify the following: $x^5 \times x^2$ _____

Simplify the following: $\dfrac{y \times y^6}{y^2}$ _____

**(Total 3)**

**Section B**

**Question 7**

Simplify $3x^2y \times 5xy^3$

.....

**(2)**

**(Total 4)**

**Question 8**

Simplify.

(i) $\frac{12c^6d}{2c^4d^4}$

.....

[3]

(ii) $3a^2b \times 4a^3b$

.....

[2]

(iii) $(x^3)^4$

.....

[1]

(iv) $(3x^2)^3$

.....

[2]

**Question 9**

Simplify $(2ab^2)^3$

**[2]**

**Question 10**

Which of these is equal to one million?

Circle your answer.

$10^3$ $10^4$ $10^5$ $10^6$ $10^7$

**(2)**

**Question 11**

**(a)** Simplify $t^4 \times t^8$

.....

Answer ..... *(1 mark)*

**(b)** Simplify $\frac{w^{15}}{w^3}$

.....

Answer ..... *(1 mark)*

**(c)** Simplify fully $(30xy^8) \div (5x^3y^4)$

.....

.....

.....

Answer ..... *(2 marks)*

**Section C**

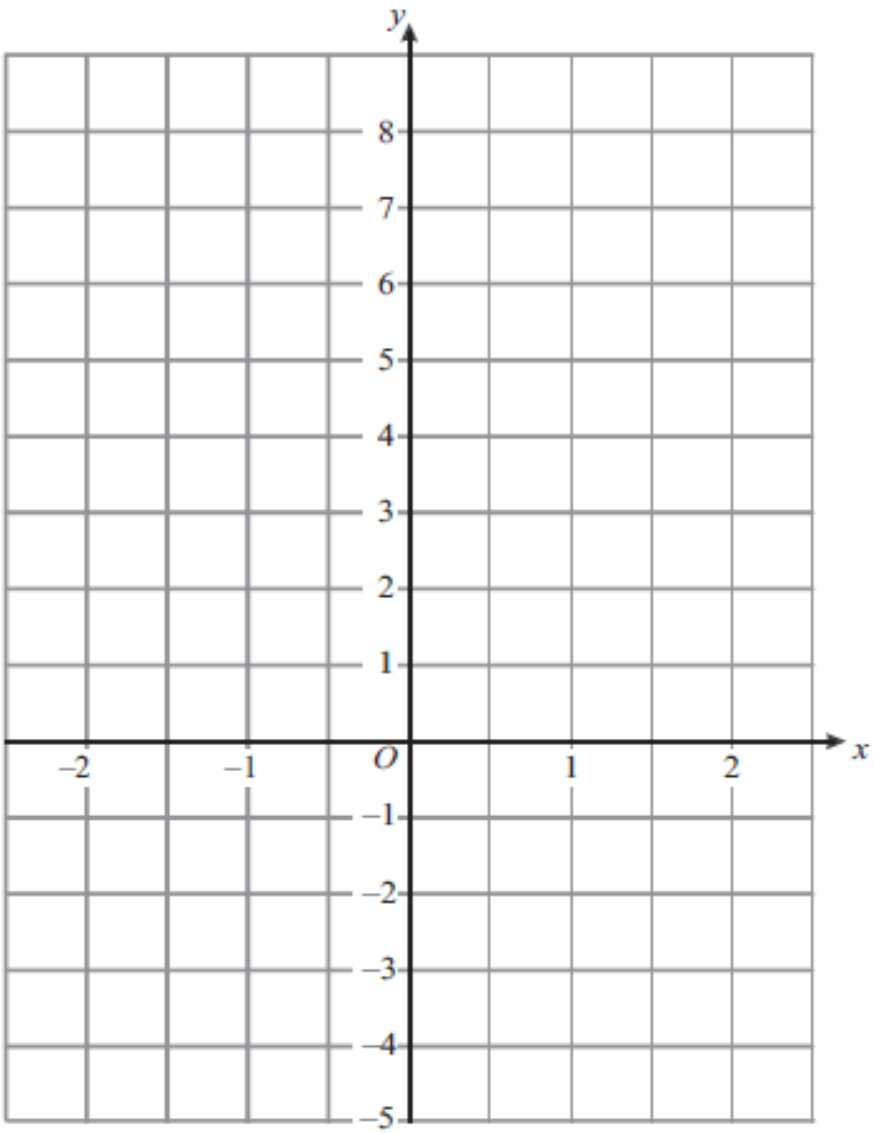
**Question 12**

(a) Complete the table of values for $y = 3x + 2$

| $x$ | –2 | –1 | 0 | 1 | 2 |
|---|---|---|---|---|---|
| $y$ | | –1 | | 5 | |

**(2)**

(b) On the grid, draw the graph of $y = 3x + 2$




**(2)**

**(Total 4 marks)**

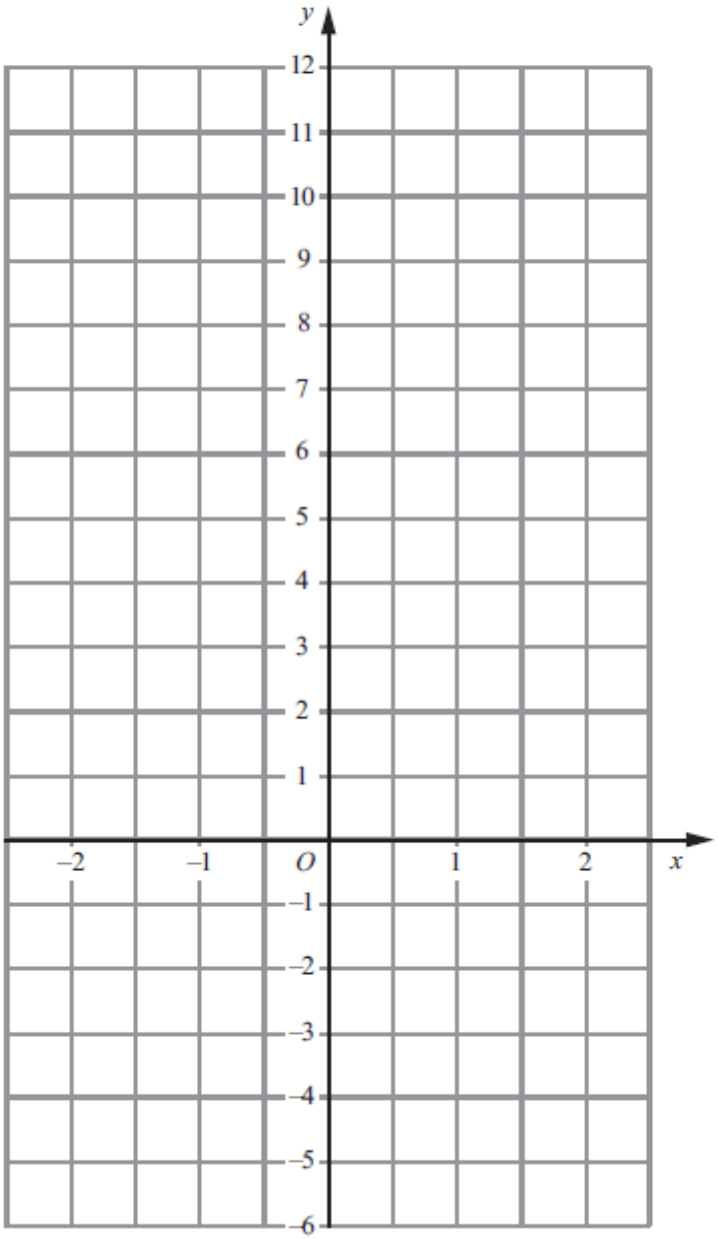
**Question 13**

(a) Complete the table of values for $y = 4x + 3$

| $x$ | −2 | −1 | 0 | 1 | 2 |
|---|---|---|---|---|---|
| $y$ | | −1 | | | 11 |

**(2)**

(b) On the grid, draw the graph of $y = 4x + 3$




**(1)**

**(total 3 marks)**

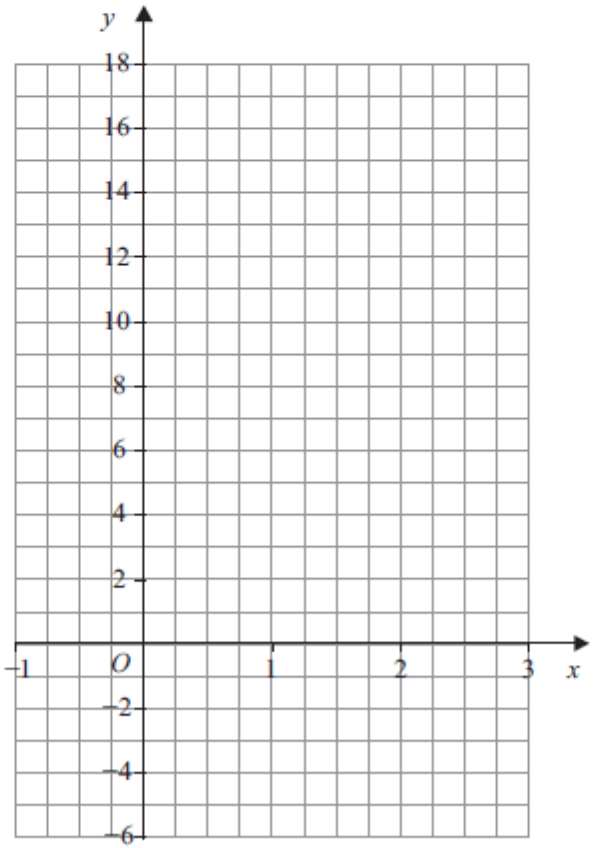
**Question 14**

(a) Complete the table of values for $y = 5x + 1$

| $x$ | −1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|
| $y$ | | 1 | | | 16 |

**(2)**

(b) On the grid, draw the graph of $y = 5x + 1$




**(1)**

**(total 3 marks)**

# Forming and solving linear equations and sequences.

**Section A**

**Question 1**

Andrew, Brenda and Callum each collect football stickers.

Andrew has *x* stickers.

Brenda has three times as many stickers as Andrew.

(a) Write down an expression for the number of stickers that Brenda has.

.....

**(1)**

Callum has 9 stickers less than Andrew.

(b) Write down an expression for the number of stickers that Callum has.

.....

**(1)**

**(Total 2 marks)**

**Question 2**

A stall sells apples and figs.

Apples cost $a$ pence each.
Figs cost $f$ pence each.

Sanjay buys 5 apples and 2 figs.
The total cost is $C$ pence.

Write down a formula for $C$ in terms of $a$ and $f$.

.....

**(Total 3 marks)**

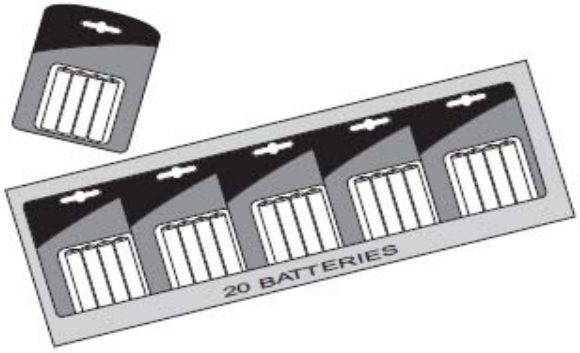
**Question 3**

Batteries are sold in packets and boxes.

Each packet contains 4 batteries.
Each box contains 20 batteries.

Bill buys $p$ packets of batteries
and $b$ boxes of batteries.
Bill buys a total of $N$ batteries.

Write down a formula for $N$ in
terms of $p$ and $b$.




.....

**(Total 3 marks)**

**Question 4**

Margaret goes on holiday to France
She pays £180 altogether for the ferry.
Her other expenses are £120 for each day of her holiday.
Write a formula for the total cost, £$C$, of her holiday when it lasts for $n$ days.

.....

[2]

**Question 5**

a. Write down the algebraic expression for 5 more than $x$

.....

**[1]**

b. Use x to represent my age in years

My brother is 5 years older than me

The sum of our ages is 111 years

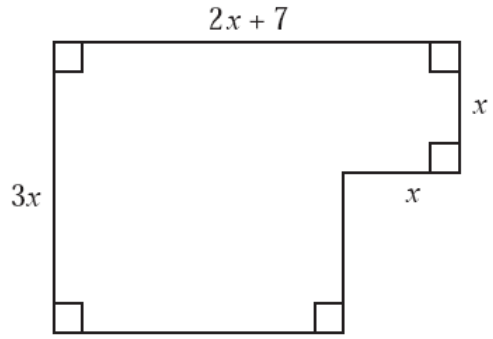
Write an equation using the information given

..... **[2]**

**Section B**

**Question 6**

The perimeter of this shape is 22 cm.




All measurements are in centimetres

Find the area.

..... cm²

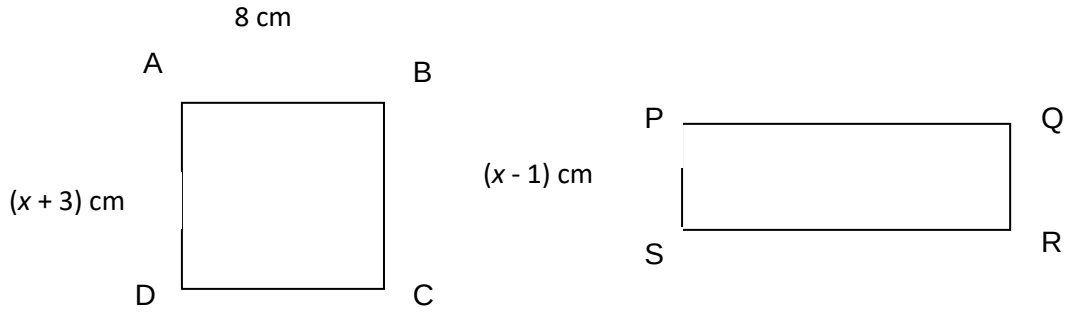
**(total 5 marks)**

]

**Question 7**

ABCD is a square

PQRS is an oblong




The oblong and the square have the same perimeter

Work out the length of PQ

Show clearly how you worked out your answer

**[4]**

**Question 8**

The sizes of the angles, in degrees, of the quadrilateral are

x + 10
2x
x + 30
x + 80

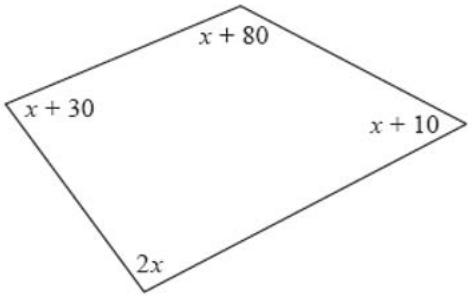



*Diagram **NOT** accurately drawn*

Use this information to write down an equation in terms of x

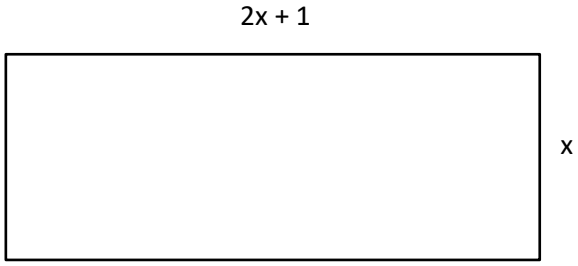
……

**(Total: 2 marks)**

**Question 9**

Below is a rectangle with length *2x + 1* and width *x.*

The perimeter of the rectangle is 82 cm. Write down an equation in terms of *x* for the perimeter of the rectangle.




……

**(Total: 2 marks)**

**Question 10**

Sarah is x years old.

Thomas is 3 years older than Sarah.

David is twice as old as Sarah.

The total of their ages is 51.

Write an equation for their total ages in terms of *x*.

**……**

**(Total: 2 marks)**

**Section C**

**Question 11**

**(a)** Here are the first three terms of a sequence.

**7 11 15 .... ....**

Which of the following is the *n*th term for this sequence?
Circle the correct answer.

$n + 4$ $4n + 7$ $4n + 3$ $7n + 4$

*(1 mark)*

**(b)** The first three terms of a different sequence are

***a*** ***b*** **c** **....** **....**

The rule for working out the next term in the sequence is

**Add 4 to the previous term and then divide by 2**

**(b) (i)** Write down an equation for $c$ in terms of $b$

.....

.....

Answer ..... *(1 mark)*

**(b) (ii)** Write down an equation for $a$ in terms of $b$

.....

.....

Answer ..... *(2 marks)*

**Question 12**

Write down the next term in each sequence.

**(a)(i)** 5 8 11 14 .....

.....

*(1 mark)*

**(a)(ii)** 6 4 2 0 .....

.....

*(1 mark)*

**(a)(iii)** 2 4 8 16 .....

.....

*(1 mark)*

**(b)** The numbers in this sequence increase by the same amount each time.

11 ..... ..... 35

What are the missing numbers?

.....

Answer……and…….

(3 marks)

**Question 13**

a) Write down the next two terms in the number pattern

3, 7, 11, 15, …, …

b) Write down, in words, the rule for finding the next number in the pattern from the one before.

c) Write down the rule for finding the nth term for the pattern

(4 marks)

**Question 14**

Here are the first four terms of a sequence.

7 13 19 25

(a) Explain why 286 cannot be in this sequence.

.....

[1]

(b) Write an expression for the $n$th term of this sequence.

.....

[2]

**Question 15**

The $n$th term of a sequence is $n^2 + 5$.

(a) Write down the first three terms of this sequence.

..... ..... .....

[2]

(b) Is the number 174 in this sequence?
Explain your answer clearly.

..... because.....

.....

[2]

**Question 16**

(a) Here are the first 3 patterns in a triangular dot sequence.

The number of dots in the *n*th pattern of the sequence is $\frac{n(n+1)}{2}$.

How many dots are there in the 20th pattern?

.....

[1]

(b) Here are the first 4 terms in another sequence.

1 3 5 7

Find an expression for the *n*th term.

.....

[2]

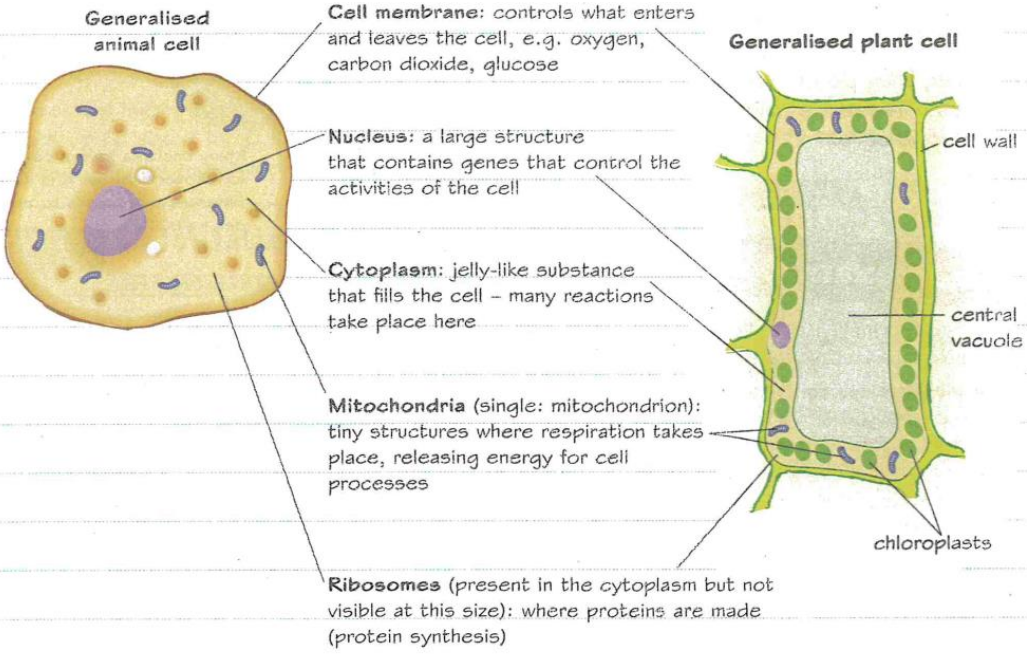
# Science

Had a look ☐ Nearly there ☐ Nailed it! ☐ Biology Papers 1 & 2

## Plant and animal cells

Animals and plants are formed from **cells**. Animal cells and plant cells have some parts in common. These parts have particular functions in a cell. Cells like these, with a nucleus and membrane-bound organelles such as mitochondria, are called eukaryotic cells.

### Generalised structures




**Worked example**

Name the three structures that are found in most plant cells but not animal cells, and describe their functions. **(4 marks)**

Chloroplasts are the structures where photosynthesis takes place to make food for the plant cell.

The cell wall is made of cellulose, and is tough so that it helps support the cell and helps it keep its shape.

The large central vacuole contains cell sap, which helps to keep the plant cell rigid.

1 mark is for naming the three structures and there is 1 mark for each function.

Watch out! The cell membrane and cell wall are different and separate structures.

**Now try this**

1 Muscle cells contain more mitochondria than skin cells. Suggest why. **(3 marks)**

2 State the names of four structures found in both plant cells and animal cells. **(4 marks)**

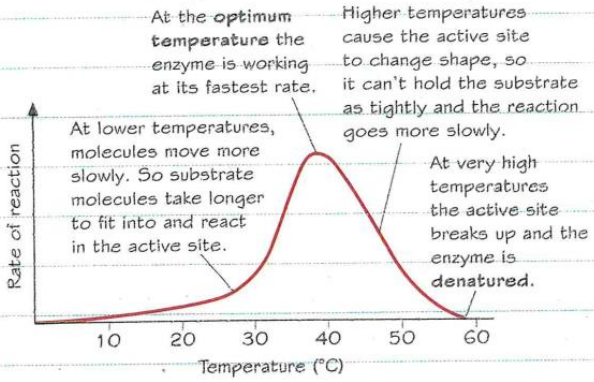
3 Suggest an explanation for why not all plant cells have chloroplasts. **(2 marks)**

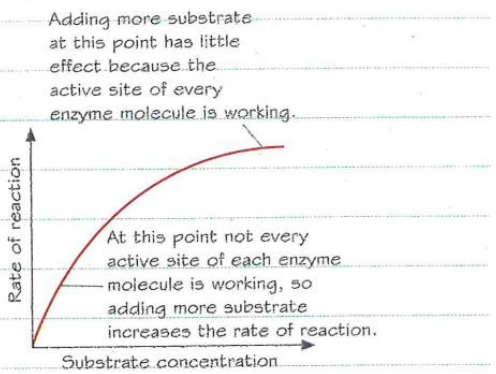
1

# Enzymes

Enzymes are biological **catalysts** that control reactions in the body. Each enzyme is **specific** (only works with one substrate) to its substrate and the **activity** of enzymes is affected by temperature, substrate concentration and pH.

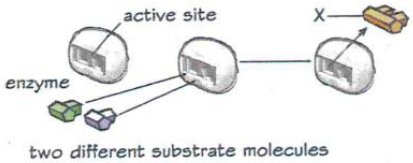
## Effect of temperature and substrate concentration




### Worked example

The diagram shows an enzyme-controlled reaction.




(a) State the name of the part labelled X. **(1 mark)**

product molecule

(b) Explain the role of the active site in an enzyme-controlled reaction. **(4 marks)**

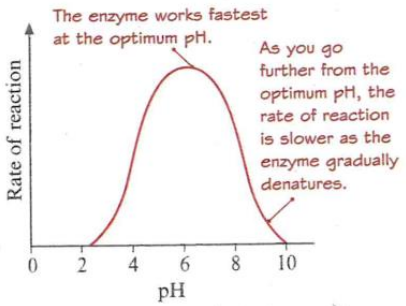
The shape of the active site matches the shape of the substrate molecules and holds them close together so bonds can form between them to make the product. The product molecule doesn't fit the active site well so it is released from the enzyme.

The **substrate** fits like a 'key' into the **active site** (the 'lock'). Enzymes are specific because only a substrate with the right shape can fit the active site.

### Worked example

Draw a graph of rate of reaction against pH for an enzyme with an optimum pH of 6. Label your graph to explain what you have drawn. **(2 marks)**

Changing the pH can change the shape of the enzyme's active site, and so change its ability to bond with the substrate.




### Now try this

1 Explain what is meant by the active site of an enzyme. **(2 marks)**

2 Enzymes in the human body have an optimum temperature of about 37 °C. Explain why our body temperature is controlled to stay at about 37 °C. **(2 marks)**

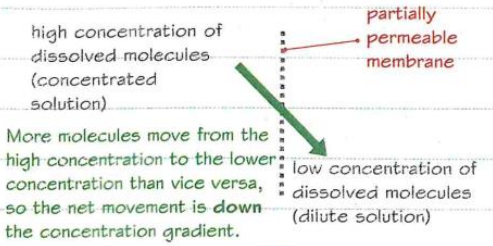
7

Papers 1 & 2 Had a look ☐ Nearly there ☐ Nailed it! ☐

# Getting in and out of cells

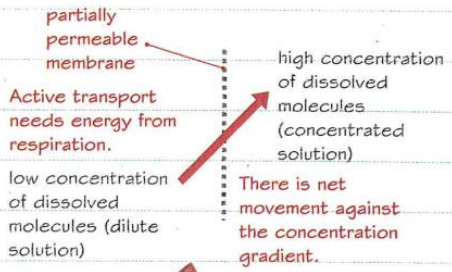
Dissolved substances (**solutes**) move into and out of cells by **diffusion** and **active transport**. Water moves into and out of cells by **osmosis**.

## Diffusion




Diffusion is important in the body, for example, to move oxygen into cells and to remove carbon dioxide.

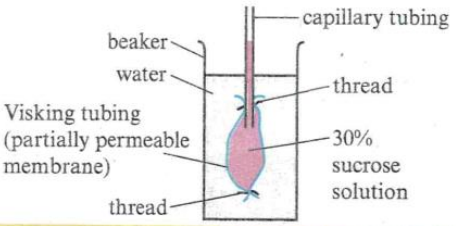
## Active transport




Active transport makes it possible for cells to absorb ions from very dilute solutions, e.g. root cells absorb minerals from soil water, and small intestine cells absorb glucose from digested food in the gut into the body.

## Worked example

The diagram shows the results of an experiment. At the start, the level of solution inside the tube and the level of water in the beaker were the same. Name the process that caused the change and explain what happened. **(3 marks)**




The process is called osmosis. To start with there were more water molecules in the water than in the same volume of sucrose solution, so more water molecules crossed the membrane into the tubing than going the other way. So the level of solution in the capillary rose.

**Osmosis** is the name given to a special case of diffusion. Osmosis is the net movement of water molecules across a partially permeable membrane from a low solute concentration to a high solute concentration.

## Now try this

1 Define **osmosis**. **(2 marks)**

2 (a) Give one similarity between diffusion and osmosis. **(1 mark)**
(b) Give one difference between diffusion and active transport. **(1 mark)**

3 A plant root is treated with a poison that prevents respiration. Explain why the root cells still absorb water from a dilute solution, but cannot absorb mineral ions. **(4 marks)**

Remember that respiration provides the energy for active transport but there are other ways that substances can enter cells which do not require energy from respiration.

# Osmosis in potatoes

Practical skills

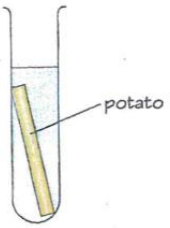
You can investigate **osmosis** by calculating the change in mass of pieces of potato that have been placed in solutions of different solute concentration.

## Core practical

### Aim

To investigate osmosis using potatoes.

### Apparatus




- pieces of potato about 3 × 1 × 1 cm
- boiling tubes
- accurate balance
- paper towels
- forceps
- solutions of different solute concentration (0, 0.2, 0.4, 0.6, 0.8, 1.0 mol dm$^{-3}$)
- marker pen

The solute in the solutions must be something that is too large to diffuse across the cell membrane. Sucrose is often used.

### Method

1 Mark the value of one solute concentration on one tube and repeat using a different tube for each concentration. Fill each tube two-thirds full of the appropriate solution.

2 Blot a piece of potato dry on a paper towel, then measure and record its mass. Use the forceps to place it into one of the tubes, and record the tube. Repeat for all tubes.

3 After 20 minutes, use the forceps to remove each piece of potato, blot it dry and measure its mass again. Record all final masses.

The change in mass may be very small. You should measure the mass in grams to 2 d.p.

Blotting removes surface water, and can help to increase the accuracy and repeatability of measurements.

Repeating the test at each solute concentration, and calculating the mean of the results, can help to reduce the effect of random variation.

### Results

The percentage change in mass of each potato slice is calculated and recorded, indicating whether mass was gained or lost.

### Conclusion

The results show that when the solution concentration is very dilute, water enters the potato cells. This is due to osmosis because the solute concentration of the potato cells is greater than the surrounding solution. As the solute concentration of the solution increases above that inside the potato cells, osmosis causes water to be lost from the potato.

Remember, finding the percentage change in mass allows you to compare results from the different tubes, because the pieces of potato weren't all exactly the same mass to begin with.

## Worked example

The initial mass of a potato slice was 16.52 g. After soaking in a solution the final mass was 20.15 g. Calculate the percentage change in mass. **(4 marks)**

$$\% \text{ change in mass} = \frac{\text{final mass} - \text{initial mass}}{\text{initial mass}} \times 100\% = \frac{20.15 - 16.52}{16.52} \times 100 = 21.97\% \text{ gained}$$

(or +21.97%)

## Now try this

The table shows the results of an osmosis experiment using potato pieces.

(a) Calculate the percentage change in mass of potato at each concentration. **(2 marks)**

(b) Use your answers to estimate the solute concentration of the potato cells. Explain your answer. **(2 marks)**

| Solution concentration (mol dm$^{-3}$) | Initial mass (g) | Final mass (g) |
|---|---|---|
| 0 | 16.52 | 20.15 |
| 0.2 | 15.90 | 16.70 |
| 0.4 | 17.06 | 15.69 |
| 0.6 | 16.88 | 14.36 |
| 0.8 | 16.23 | 12.32 |

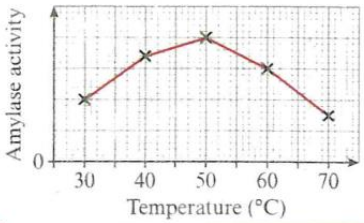
Papers 1 & 2 Had a look ☐ Nearly there ☐ Nailed it! ☐

# Extended response – Key concepts

There will be one or more 6-mark questions on your exam paper. For these questions, you will need to think scientifically and structure your answer logically, showing how the points you make are related to each other. For the questions on this page, you can revise the topics on **enzyme activity** on pages 7 to 9.

## Worked example

The graph shows the results of an experiment into the effect of temperature on the activity of the enzyme amylase on starch. Explain the results shown in the graph. **(6 marks)**




The graph shows that activity of the bacterial amylase increased from 30°C up to a maximum at 50°C, and then decreased as the temperature increased further to 70°C. The maximum activity is at the optimum temperature, which is about 50°C for this enzyme.

Before you explain the results, describe what the graph shows. Use values on the graph to add details to your answer. Remember to include important science words that are relevant in your answer.

Enzyme activity increases with increasing temperature up to the optimum because particles move faster. Starch molecules fit into the active site of enzyme molecules more quickly and are broken down more quickly, releasing the active site for another starch molecule.

Enzyme activity should be linked to how the active site of the enzyme and the substrate interact.

Beyond the optimum temperature, the shape of the active site starts to change, making it more difficult for the substrate to fit into it. So activity slows down. The active site shape changes more as temperature increases further, until the enzyme becomes denatured and stops being able to catalyse the reaction.

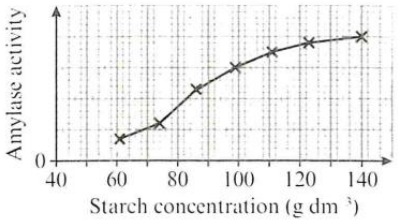
Make sure you explain each part of the graph clearly, linking your knowledge and understanding to give a good explanation of what is happening.

### Command word: Explain

An **explain** question requires a reason for what is happening. Use a word such as 'because' to clearly link a description with its reason.

## Now try this

The graph on the right shows the effect of starch concentration on the activity of a bacterial amylase. Explain the results shown in the graph. **(6 marks)**




2

# Other resources

If you require any other additional work, please visit the websites below:

**English:**

https://www.gcsepod.com/

https://www.bbc.co.uk/bitesize/subjects/z3kw2hv

https://www.educationquizzes.com/ks3/english/

https://www.senecalearning.com/

**Maths:**

www.vle.mathswatch.co.uk

Students have their own log in - Example name and Year (John Smith Year 9 – Johsmit9@lighthall)

123456

www.mathsgenie.co.uk

www.corbettmaths.com

**Science:**

Primary resource - https://www.bbc.co.uk/bitesize/subjects/zng4d2p

Additional resource - https://www.educationquizzes.com/ks3/science/

## Freesciencelessons - YouTube

Freesciencelessons is driven by a core belief. Education leads to social mobility. Therefore, every student deserves outstanding teaching, no matter where th...

www.youtube.com

## KS3 Science - BBC Bitesize

KS3 Science learning resources for adults, children, parents and teachers organised by topic.

www.bbc.co.uk