Please make sure that you print this resource at 100% so that all measurements are correct.
To do this, follow the relevant steps below.

### Adobe Reader or Adobe Acrobat
- Adobe Reader is a free PDF viewer, from Adobe. To install a copy of Adobe Reader, go to https://get.adobe.com/uk/reader/.

- Once Adobe Reader is installed, open your PDF.

- Go to File>Print.

- Under 'Page Sizing & Handling', select 'Size'.

- From here, make sure that 'Actual Size' is selected.

- Print this page as a test, making sure that the shape below is the correct size once printed.

- If the test print is correct, print your PDF.

Foxit Reader
- Go to File>Print.

- Set the 'Scaling' to 'None'.

- Print this page as a test, making sure that the shape below is the correct size once printed.

- If the test print is correct, print your PDF.

Web Browser
- If printing from a web browser, such as Chrome, Firefox or Microsoft Edge make sure that your printer is set to print at 100%, either by unticking 'Fit to Page' or selecting 'Actual Size'.

- Print this page as a test, making sure that the shape below is the correct size once printed.

- If the test print is correct, print your PDF.

5cm
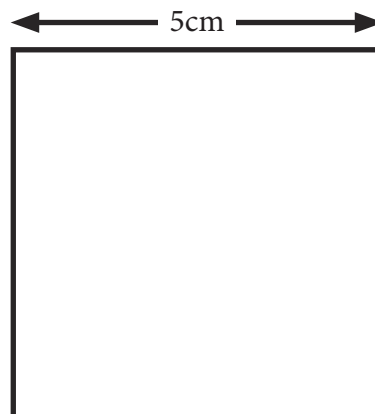
Notes for Teachers:
Differentiation for Maths Mystery Games

The Maths Mystery Games are meant to be a fun way to work on different maths skills whilst using them in real-life situations with the added bonus of catching a criminal and solving a crime!

The games can be done clue by clue over a number of days/lessons or as a whole lesson at the end of a week or unit.

The games are meant to bring a class together and in preparation for SATs tests all children work on the same game. However, differentiation can be done in a number of ways:

- Buddying up HA/LA and other mixed ability children encouraging them to work as a team listening to everyone and HA children taking on mentoring roles. HA could even be team leaders in groups also responsible for making sure everyone is included.

- **Letting children use the UKS2 Maths hint Revision Cards to work with during the game.**

- Having some children work with an adult.

- Letting some children use calculators.

- Working together as a class and giving different children or table groups different parts to work on and pooling ideas and working through it together.

- There are also LKS2 maths mystery games available if you prefer lower differentiation bearing in mind that the subject matter and clues will not be the same.

- Starters: There will also be your own reminders of work you have done in class with maybe a reminder on the board of specific areas such as making common denominators or a mental starter that recaps on certain skills.

Note: Please print at 100% in order for clue 5 to work!

The Mystery of the Panto Purloiner

It is the end of the final panto show before the two-day Christmas break for the cast and crew of Cinderella at the Theatre Royal in Panto Town.

Everyone was enjoying the Christmas show party, when the director Winnie Wheelberg screeched in disgust and shock, as she proclaimed that all the Secret Santa presents for the actors had been stolen!

You are the chief detective in charge of the case and with the help of your Scene of Crime Officers (SOCOs), you have only half a day to find the culprit so everyone can get their presents back in time for Christmas.

The only people with access to the area were the actors during the panto. Solve the following clues to find out the identity of the perpetrator based on their part in the panto, acting skill, shoe size, amount of time on stage and the Secret Santa present that they bought.

Good Luck... the cast and crew of the Panto Town panto are relying on you!
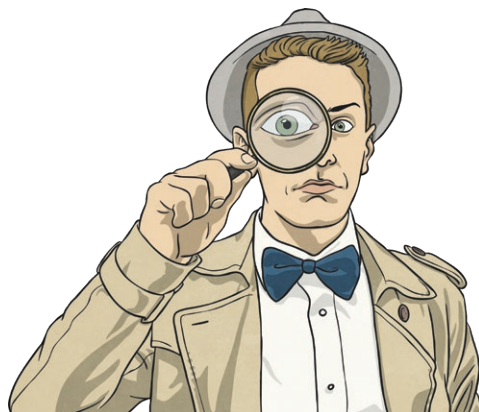
Name	Part	Acting Skill	Shoe Size	Time on Stage	Type of Present Bought
Annie Advent	Dancer	Amateur	5	1 hour	Toiletries
Abdul Angel	Ensemble	Semi-Pro	7	55 mins	Chocolate
Bob Bauble	Ugly Sister	Professional	8	1h 5mins	Book
Bonnie Boxing-Day	Ensemble	Semi-Pro	10	55 mins	Funny
Colleen Crackers	Cinderella	Professional	6	1h 40mins	Ornament
Chris Christingle	Ensemble	Amateur	9	55 mins	Toiletries
Dec December	Buttons	Semi-Pro	5	70 mins	Book
Disa Dinner	Dancer	Professional	7	1 hour	Funny
Elvis Elf	Prince Charming	Professional	10	45 mins	Chocolate
Eve Eggnog	Cook	Semi-Pro	5	40 mins	Chocolate
Farah Fairy	Dancer	Amateur	8	1 hour	Funny
Frederik Festive	The King	Semi-Pro	10	$\frac{1}{2}$ hour	Toiletries
Goldie Gold-Rings	Ensemble	Amateur	5	55 mins	Funny
Gordon Goose	Ensemble	Semi-Pro	7	55 mins	Book
Holly Holidays	Dancer	Professional	6	1 hour	Chocolate
Harry Holly-Berry	Footman	Amateur	9	45 mins	Toiletries
Ivan Ivy	Ensemble	Semi-Pro	8	55 mins	Funny
Isa Icicle	Dandini	Amateur	4	1 hour	Toiletries
Joel Jolly	Stepmother	Professional	9	45 mins	Ornament
Joanne Joseph	Ensemble	Semi-Pro	7	55 mins	Chocolate
Kris Kringle	Footman	Semi-Pro	10	40 mins	Funny

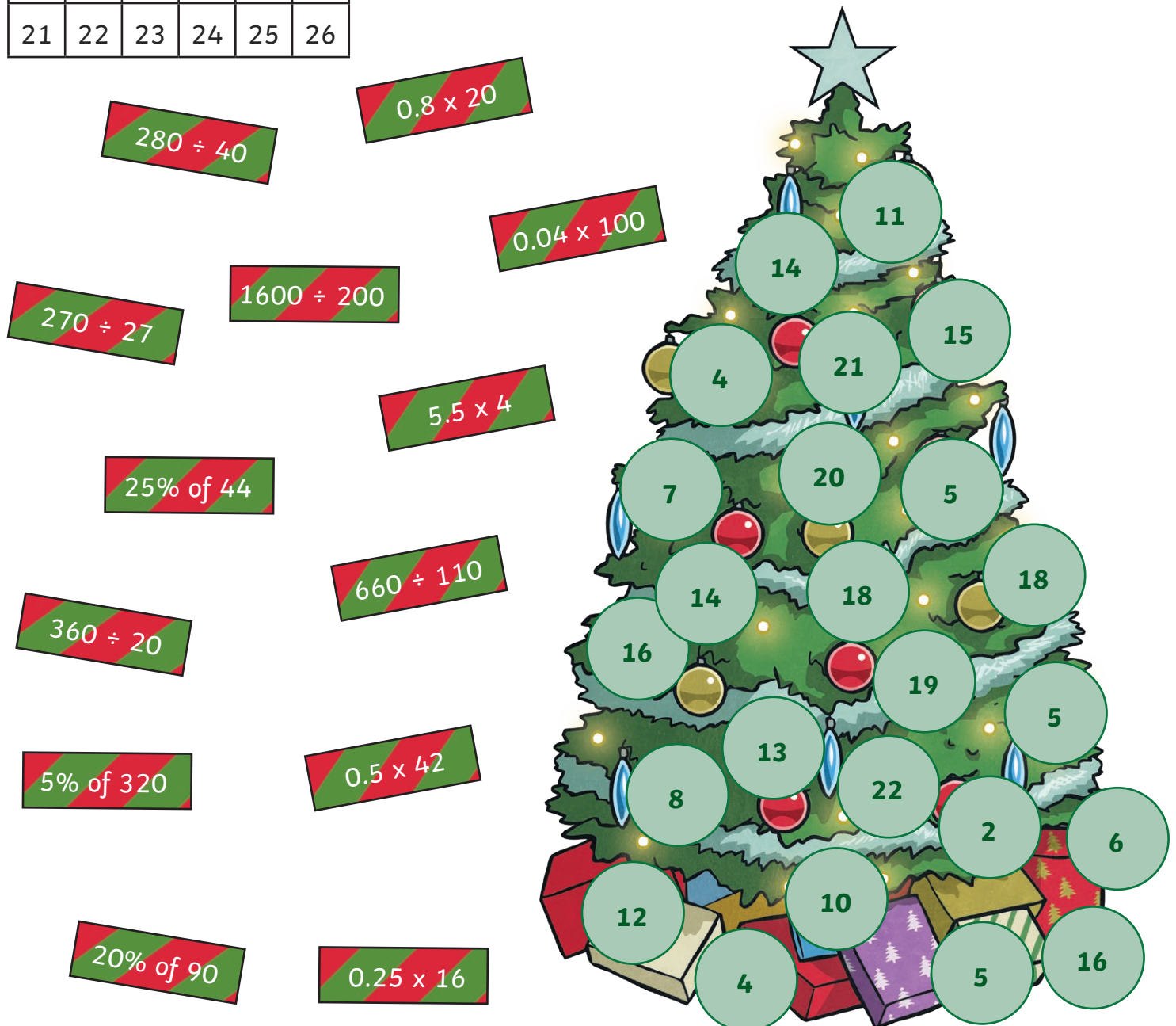|					
Katie Kings	Stepmother	Amateur	9	35 mins	Book
Laura Lords-Leaping	Ensemble	Professional	6	55 mins	Chocolate
Lars Lapland	Footman	Semi-Pro	8	45 mins	Funny
Minnie Midwinter	Ensemble	Amateur	7	55 mins	Ornament
Maurice Mince-Pie	Baron Hardup	Amateur	5	$\frac{1}{2}$ hour	Toiletries
Noel	Ugly Sister	Professional	9	65 mins	Book
Nikki Nicholas	Ensemble	Semi-Pro	4	55 mins	Chocolate
Olaf Orient-Are	Footman	Amateur	8	45 mins	Funny
Orla Oh-Little-Town	Dancer	Professional	7	1 hour	Book
Preetie Pudding	Fairy Godmother	Professional	5	50 mins	Chocolate
Pav Panto	Ensemble	Amateur	8	55 mins	Toiletries

Clue 1

You spent some time looking at the timings of the robbery and you worked out that the gifts could have only been taken during certain parts of the show. This has enabled you to rule out some of the cast.

Solve the clue below by crossing out the baubles that are the answers to the calculations.

The remaining numbers (read left to right and top to bottom) will spell out the clue, using the code:

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

u	v	w	x	y	z
21	22	23	24	25	26

$280 \div 40$

0.8×20

0.04×100

$1600 \div 200$

$270 \div 27$

5.5×4

25% of 44

$660 \div 110$

$360 \div 20$

5% of 320

0.5×42

20% of 90

0.25×16

11
14
15
4
21
7
20
5
14
18
18
16
19
13
5
8
22
2
6
12
10
4
5
16

Clue 2

You have worked out that taking and hiding the presents would take a certain amount of time when other actors weren't around. Therefore, the deed must have been done by an actor who had time to do all this.

To solve this clue, work out the times for each of the events in a typical Saturday daytime at the theatre during panto season and then work out the mean average of all the timings. The thief was on stage for less than the average time.

Event	Start time	Finish time	Duration
Rehearsals	10:07	11:12	
Make-up, costume and lunch.	12:12	13:57	
1st half of matinee show	13:57	14:44	
Interval ice cream sales	14:44	15:08	
2nd half of matinee show	15:08	15:51	
Audience leaves and souvenir shop opens	15:51	16:19	
Clearing and cleaning of auditorium between shows	16:19	17:50	
Briefing of evening stewarding and security staff	17:50	18:06	
Doors open for evening show and pre-show entertainment	18:06	18:37	
		Mean Average	

Clue 3

The SOCOs have found a part of a membership card for an acting society dropped under the Christmas tree. They are assuming that this belongs to the Secret Santa stealer. Part of the card gives you some more information about the actor.

To find out the clue, solve the Roman numeral calculations below. Find the answer in normal numbers and translate them into letters to spell out the clue.

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t
26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7

u	v	w	x	y	z
6	5	4	3	2	1

Answer **Letter**

MCMLXXXIV - MCMLXXVI =

MMDCXL ÷ CXX =

MMDCCC ÷ CC =

MXVII - CMXCIX =

MMD - MMCDLXXXIX =

CDV ÷ XLV =

MDCCCLXXIX - MDCCCLXVII =

Clue 4

The SOCOs have found some footprints in some fallen glitter and fake snow under the tree that fits the patterns of someone collecting all the presents. Although the print is not clear enough to identify a particular shoe, it is enough to find out what shoe size it could be.

To solve this clue, fill in this Venn diagram with the numbers from 1-30.

The possible shoe sizes belonging to the pilferer will be revealed in the pink section.

Factors of 24

Factors of 30

Factors of 20
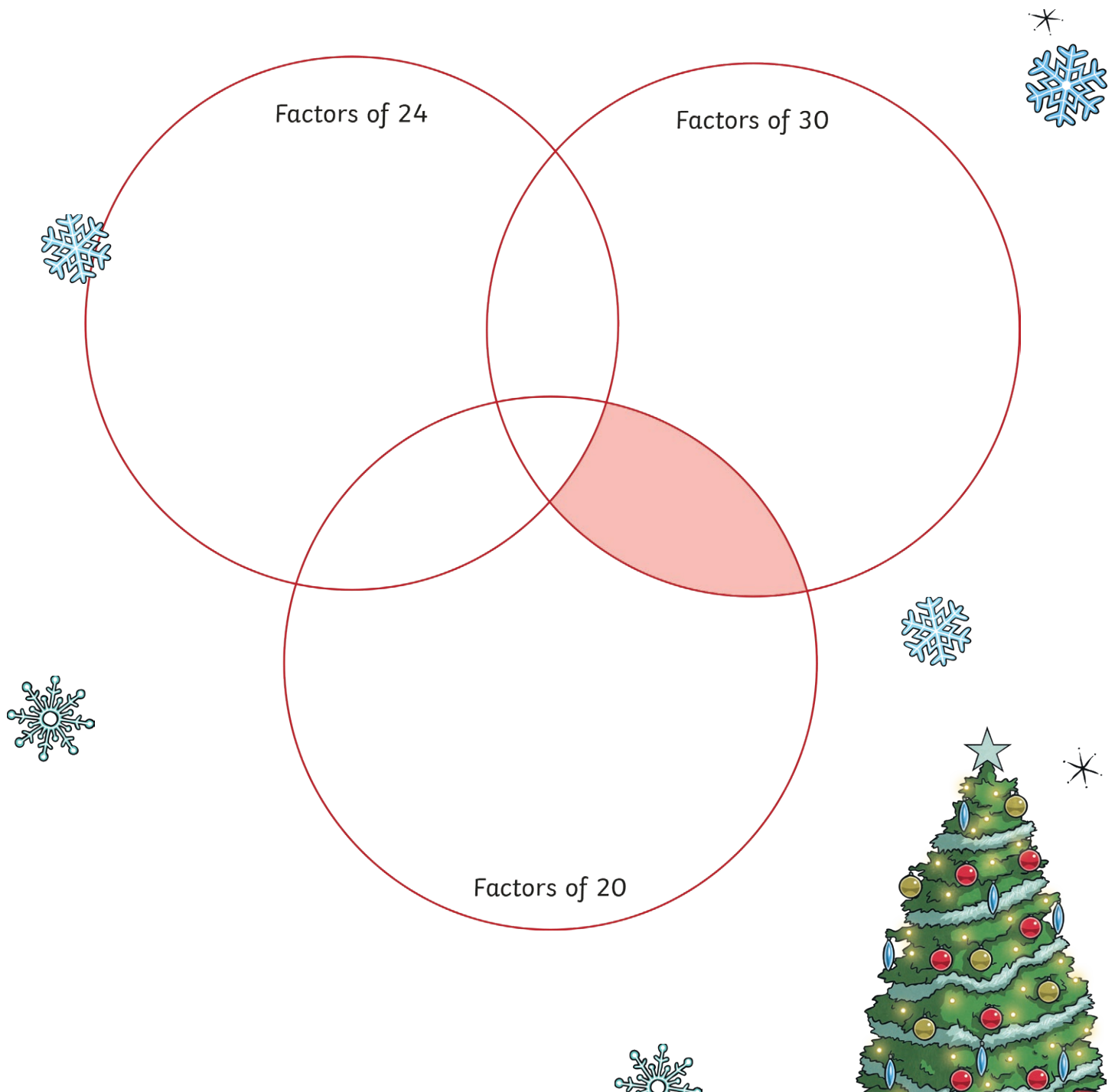
Clue 5

After following the trail of dodgy footprints, glitter and a faint aroma of stage makeup and deep heat, you have found the stash of Christmas presents hidden in the false bottom of the pumpkin carriage. The director, cast and crew are amazed and delighted to get their presents and festive spirit back, but who purloined the gifts?

The SOCOs inspected the carriage and presents before giving them to their rightful owners and found a jacket with a receipt for a present – the thief's Secret Santa purchase. To find out what it revealed, measure to the nearest centimetre the lengths of wig hair on the left, found in the carriage. The number of centimetres will give you a letter of the alphabet using the code, 1 = a, 2 = b, 3 = c etc, to spell out the answer.
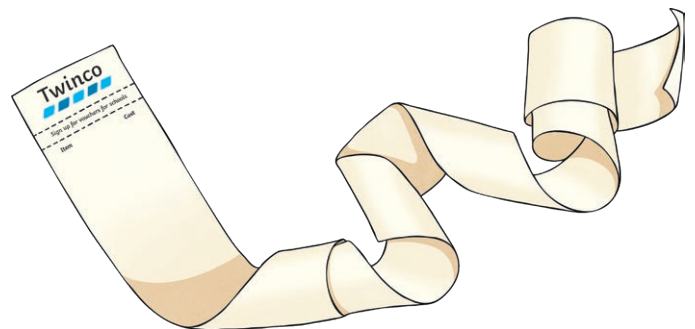
The Confession

When the culprit was finally caught, the finger prints from the acting card were matched with prints inside the carriage so there was no doubt about the guilty party.

But, when the purloiner was asked if they had stolen the presents, they said this:

x	12	9	7	3	20	6	8	4	30	5
10	O	M	©	R	Q	V	N	A	L	)
5	V	F	:	C	#	R	A	(	@	=
4	B	E	G	-	N	H	D	W	O	+
7	''	!	Z	I	\	S	.	G	$	:
9	U	[	!	☹	T	☺	Y	E	<	F
100	K	/	£	L	&	J	%	?	P	'
3	E	☹	I	~	V	,	H	-	M	C
8	]	Y	.	H	*	B	X	D	?	A
12	'	U	''	E	?	Y	"	B	;	V
6	Y	☺	S	,	O	E	B	H	T	R

120	24	80	120	21	32	21	32	80	144	180

120	24	72	36	42	21	32	21	32	63

Answers

Clue 1:

Reveals: not ensemble

Please note: the numbers 4 and 16 and 18 appear twice on the tree; two questions generate each as an answer, so both should be crossed out when the pupil has worked through all the calculations.
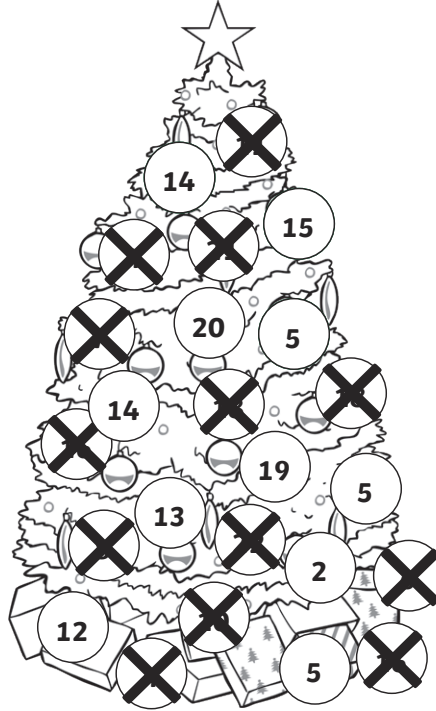
Clue 2:

Reveals: The actor cannot have been on stage for longer than 50 minutes (50 minutes is OK, but not more).

Event	Start time	Finish time	Duration
Rehearsals	10:07	11:12	65 mins
Make-up, costume and lunch.	12:12	13:57	105 mins
1st half of matinee show	13:57	14:44	47 mins
Interval ice cream sales	14:44	15:08	24 mins
2nd half of matinee show	15:08	15:51	43 mins
Audience leaves and souvenir shop opens	15:51	16:19	28 mins
Clearing and cleaning of auditorium between shows	16:19	17:50	91 mins
Briefing of evening stewarding and security staff	17:50	18:06	16 mins
Doors open for evening show and pre-show entertainment	18:06	18:37	31 mins
		Mean Average	**50 mins**

Answers

Clue 3:

Reveals: semi-pro

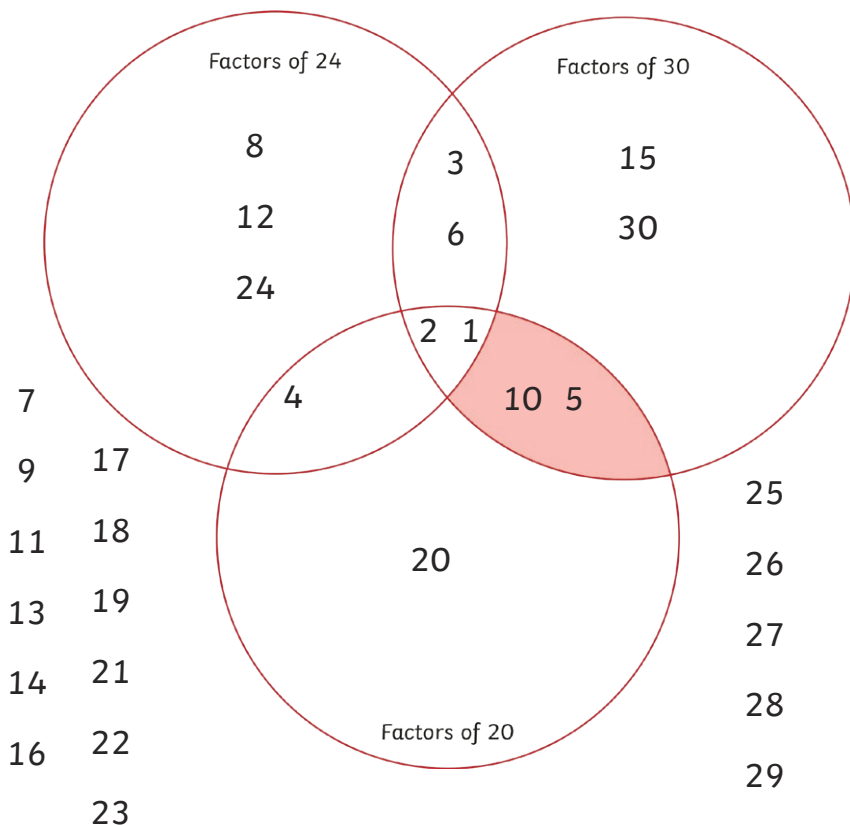|				Answer	Letter
MCMLXXXIV	-	MCMLXXVI	=	8	S
MMDCXL	÷	CXX	=	22	E
MMDCCC	÷	CC	=	14	M
MXVII	-	CMXCIX	=	18	I
MMD	-	MMCDLXXXIX	=	11	P
CDV	÷	XLV	=	9	R
MDCCCLXXIX	-	MDCCCLXVII	=	12	O

Clue 4:

Reveals: 10 or 5

Factors of 24

Factors of 30

8
12
24

3
6

15
30

2 1

4

10 5

7
9   17
11   18
13   19
14   21
16   22
23

20

Factors of 20

25
26
27
28
29

Clue 5:

Spells: from a joke shop

(therefore they bought a funny present).

The Culprit:

Kris Kringle

The Confession:

Oh no I didn't

Oh yes I did!