Sismo Learning

LESSON NOTE || MEASUREMENT

Year 6 || Conversion of Time

Converting between seconds, minutes, hours, days, weeks, months, years, decades and centuries, including mixed units, decimals and fractions of an hour, and multistep problems.

Units of time | Larger to smaller | Smaller to larger | Mixed units | Decimal hours | Problem solving

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BEFORE WE BEGIN

How this lesson note works

This note follows the Sismo **S.I.S.M.O** learning journey. Every concept moves from seeing an idea, to understanding why it works, to solving, practising and stretching yourself.

S
See
Spot time conversions in everyday life.

I
Investigate
Learn the facts and why the method works.

S
Solve
Follow six fully worked examples.

M
Master
Practise six questions on your own.

O
Outperform
Take on the challenge questions.

S See: time all around us

A football match lasts 90 minutes. Is that 1.30 hours? A recipe says to bake a cake for 0.75 of an hour; how many minutes should the timer show? A flight is 2 h 45 min long and leaves at 08:45; when does it land?

Each of these needs you to **convert between units of time**. By the end of this note you will answer all of them with confidence. (Spoiler: 90 minutes is 1.5 hours, **not** 1.30 hours!)

Learning objectives

- I know the conversion facts between seconds, minutes, hours, days, weeks, months, years, decades, centuries and millennia.
- I can convert from a larger unit to a smaller unit by multiplying, including in more than one step.
- I can convert from a smaller unit to a larger unit by dividing, writing any remainder in the smaller unit.
- I can convert, add, subtract and compare times written in mixed units.
- I can convert between decimals or fractions of an hour and minutes.
- I can solve multistep problems involving time.

Key vocabulary

Word	Meaning
Convert	Change a measurement from one unit to another without changing the amount of time.
Conversion fact	How many of one unit make another, e.g. 60 minutes = 1 hour.

Mixed units	A time written with two units, such as 3 h 20 min.
Exchange	Swap one larger unit for its equal amount of smaller units, e.g. 1 hour for 60 minutes.
Remainder	The amount left over after dividing; in time it is written in the smaller unit.
Leap year	A year with 366 days; February has 29 days. It happens every 4 years.
Fortnight	Two weeks, which is 14 days.
Decade, century, millennium	10 years, 100 years and 1,000 years.

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CONCEPT 1

Units of time and how they link

I Investigate

Time is measured in many different units. Small units such as **seconds** and **minutes** are used for short events, like a race or a song. Large units such as **years**, **decades** and **centuries** are used for long stretches of time, like a person's age or history.

To convert between units of time you must know the **conversion facts**: how many of the smaller unit make one of the larger unit. Unlike length or mass, time does **not** work in tens and hundreds. There are 60 seconds in a minute, 60 minutes in an hour and 24 hours in a day.

Smaller unit		Larger unit
60 seconds	=	1 minute
60 minutes	=	1 hour
24 hours	=	1 day
7 days	=	1 week
14 days	=	1 fortnight
12 months	=	1 year
365 days (366 in a leap year)	=	1 year
52 weeks and 1 day	=	1 year (365 days)
10 years	=	1 decade
100 years	=	1 century
1,000 years	=	1 millennium

The time conversion ladder. Moving **left** to a smaller unit, you **multiply**. Moving **right** to a larger unit, you **divide**.



Days in each month

31 days	January, March, May, July, August, October, December
30 days	April, June, September, November
28 or 29 days	February (29 days in a leap year)

Knuckle method: make a fist. Counting across your knuckles and the dips between them, every month that lands on a knuckle has 31 days; every month in a dip has 30 days (or fewer for February).

KEY IDEA

Larger unit → smaller unit: **multiply** (the number gets bigger).
Smaller unit → larger unit: **divide** (the number gets smaller).

WATCH OUT

- Time is **not** a base ten system. There are 60 minutes in an hour, **not** 100.
- A month is **not** exactly 4 weeks. Months have 28, 29, 30 or 31 days, so 4 weeks (28 days) is shorter than most months.
- A leap year has 366 days because February gains an extra day (29 February).

S Solve: worked examples

Worked Example 1.1 [1 mark]

How many months are there in 4 years?

Step 1: Write the conversion fact
1 year = 12 months

Step 2: Decide the operation
Years are larger than months, so we are going from a larger unit to a smaller unit.
Larger to smaller means **multiply** by 12.

Step 3: Calculate
4 × 12 = 48

ANSWER	4 years = **48 months**

Worked Example 1.2 [1 mark]

How many days are there in 3 fortnights?

Step 1: Write the conversion fact
1 fortnight = 14 days

Step 2: Decide the operation
Fortnights are larger than days, so we are going from a larger unit to a smaller unit.
Larger to smaller means **multiply** by 14.

Step 3: Calculate
3 × 14 = 42

ANSWER	3 fortnights = **42 days**

Worked Example 1.3 [1 mark]

How many decades are there in 70 years?

Step 1: Write the conversion fact
1 decade = 10 years

Step 2: Decide the operation
Years are smaller than decades, so we are going from a smaller unit to a larger unit.
Smaller to larger means **divide** by 10.

Step 3: Calculate
70 ÷ 10 = 7
Check: 7 × 10 = 70 ✓

ANSWER	70 years = **7 decades**

Worked Example 1.4 [1 mark]

How many centuries are there in 600 years?

Step 1: Write the conversion fact
1 century = 100 years

Step 2: Decide the operation
Years are smaller than centuries, so we are going from a smaller unit to a larger unit.
Smaller to larger means **divide** by 100.

Step 3: Calculate
600 ÷ 100 = 6
Check: 6 × 100 = 600 ✓

ANSWER	600 years = **6 centuries**

Worked Example 1.5 [2 marks]

Is 2028 a leap year? How many days will February 2028 have?

Step 1: Recall the leap year rule
A leap year comes every 4 years. Years that divide exactly by 4 are leap years.
In a leap year February has 29 days instead of 28.

Step 2: Divide the year by 4
2028 ÷ 4 = 507
There is no remainder, so 2028 divides exactly by 4.

Step 3: Make the decision
2028 is a leap year, so February 2028 has 29 days.

ANSWER	2028 is a leap year. February 2028 has **29 days**.

Worked Example 1.6 [2 marks]

How many days are there altogether in April, May and June?

Step 1: Recall the days in each month

April has 30 days.
May has 31 days.
June has 30 days.

Step 2: Add them together

30 + 31 + 30 = 91

ANSWER	91 days

M Master: practice questions

Show your working in the space under each question. Answers are in the Answer Key at the back.

P1.1 [1 mark]

How many months are there in 7 years?

P1.2 [1 mark]

How many days are there in 9 weeks?

P1.3 [1 mark]

How many years are there in 5 centuries?

P1.4 [2 marks]

A millennium is 1,000 years. How many decades are there in a millennium?

P1.5 [2 marks]

Which of these years are leap years? 2024 2026 2032

P1.6 [2 marks]

How many days are there altogether in July, August and September?

CONCEPT 2

Converting from larger units to smaller units

I Investigate

When we change a larger unit into a smaller unit, we will need **more** of the smaller unit to cover the same amount of time. So the number gets bigger, and we **multiply**.

For example, 1 minute is 60 seconds, so 5 minutes is 5 lots of 60 seconds: 5 × 60 = 300 seconds.

Sometimes there is no single fact linking the two units, for example hours and seconds. Then we go **one step at a time** along the ladder: hours → minutes → seconds.

Useful totals		
1 hour	=	60 × 60 = 3,600 seconds
1 day	=	24 × 60 = 1,440 minutes
1 week	=	7 × 24 = 168 hours

KEY IDEA

Larger → smaller: multiply by the conversion fact. If there is no direct fact, convert one step at a time along the ladder.

WATCH OUT

- Do not divide when going to a smaller unit. Ask yourself: should the answer be a **bigger** number? (Yes, it should.)
- Hours to seconds is **two** steps: × 60 then × 60 again (× 3,600 in total). Do not stop after one step.
- Days to hours uses **24**, not 60.

S Solve: worked examples

Worked Example 2.1 [1 mark]

Convert 8 minutes to seconds.

Step 1: Write the conversion fact
1 minute = 60 seconds

Step 2: Decide the operation
Minutes are larger than seconds, so we are going from a larger unit to a smaller unit.
Larger to smaller means **multiply** by 60.

Step 3: Calculate
8 × 60 = 480

ANSWER	8 minutes = **480 seconds**

Worked Example 2.2 [1 mark]

Convert 7 hours to minutes.

Step 1: Write the conversion fact
1 hour = 60 minutes

Step 2: Decide the operation
Hours are larger than minutes, so we are going from a larger unit to a smaller unit.
Larger to smaller means **multiply** by 60.

Step 3: Calculate
7 × 60 = 420

ANSWER	7 hours = **420 minutes**

Worked Example 2.3 [1 mark]

Convert 5 days to hours.

Step 1: Write the conversion fact
1 day = 24 hours

Step 2: Decide the operation
Days are larger than hours, so we are going from a larger unit to a smaller unit.
Larger to smaller means **multiply** by 24.

Step 3: Calculate
5 × 24 = 120

ANSWER	5 days = **120 hours**

Worked Example 2.4 [2 marks]

Convert 3 hours to seconds.

Step 1: Plan the route
There is no single fact for this, so convert one step at a time:
hours → minutes → seconds

Step 2: Convert hours to minutes
1 hour = 60 minutes, so multiply by 60.
3 × 60 = 180 minutes

Step 3: Convert minutes to seconds
1 minute = 60 seconds, so multiply by 60.
180 × 60 = 10,800 seconds

ANSWER	10,800 seconds

Worked Example 2.5 [2 marks]

Convert 2 weeks to hours.

Step 1: Plan the route
There is no single fact for this, so convert one step at a time:
weeks → days → hours

Step 2: Convert weeks to days
1 week = 7 days, so multiply by 7.
2 × 7 = 14 days

Step 3: Convert days to hours
1 day = 24 hours, so multiply by 24.
14 × 24 = 336 hours (14 × 24 = 10 × 24 + 4 × 24 = 240 + 96 = 336)

ANSWER	336 hours

Worked Example 2.6 [3 marks]

How many seconds are there in 1 day?

Step 1: Plan the route

There is no single fact for this, so convert one step at a time:
days → hours → minutes → seconds

Step 2: Convert days to hours

1 day = 24 hours, so multiply by 24.
1 × 24 = 24 hours

Step 3: Convert hours to minutes

1 hour = 60 minutes, so multiply by 60.
24 × 60 = 1,440 minutes

Step 4: Convert minutes to seconds

1 minute = 60 seconds, so multiply by 60.
1,440 × 60 = 86,400 seconds

ANSWER	86,400 seconds

M Master: practice questions

Show your working in the space under each question. Answers are in the Answer Key at the back.

P2.1 [1 mark]

Convert 12 minutes to seconds.

P2.2 [1 mark]

Convert 9 hours to minutes.

P2.3 [1 mark]

Convert 3 days to hours.

P2.4 [2 marks]

Convert 2 hours to seconds.

P2.5 [2 marks]

Convert 3 days to minutes.

P2.6 [2 marks]

A book festival lasts exactly 1 week. How many hours is that?

CONCEPT 3

Converting from smaller units to larger units

I Investigate

When we change a smaller unit into a larger unit, we need **fewer** of the larger unit, so the number gets smaller and we **divide**.

Often the division does not work out exactly. The **remainder** is left over in the **smaller unit**. For example:

130 minutes ÷ 60 = 2 remainder 10 → **2 hours 10 minutes**

A good way to divide by 60 is to count up in sixties: 60, 120, 180, 240, 300 ... Stop at the largest one that fits, then find what is left over.

KEY IDEA

Smaller → larger: divide by the conversion fact. Any remainder stays in the smaller unit.

WATCH OUT

- 135 minutes is **not** 1.35 hours or 1 hour 35 minutes. Divide by 60: it is 2 hours 15 minutes.
- Your remainder must always be **less than** the conversion fact. A remainder of 70 minutes means another hour still fits.
- Label the remainder with the smaller unit (minutes, seconds, days ...).

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S Solve: worked examples

Worked Example 3.1 [1 mark]

Convert 300 seconds to minutes.

Step 1: Write the conversion fact
1 minute = 60 seconds

Step 2: Decide the operation
Seconds are smaller than minutes, so we are going from a smaller unit to a larger unit.
Smaller to larger means **divide** by 60.

Step 3: Calculate
300 ÷ 60 = 5
Check: 5 × 60 = 300 ✓

ANSWER	300 seconds = **5 minutes**

Worked Example 3.2 [2 marks]

Convert 135 minutes to hours and minutes.

Step 1: Write the conversion fact
1 hour = 60 minutes

Step 2: Decide the operation
Minutes are smaller than hours, so we are going from a smaller unit to a larger unit.
Smaller to larger means **divide** by 60.

Step 3: Divide and find the remainder
How many groups of 60 fit into 135?
2 × 60 = 120
135 − 120 = 15
So 135 ÷ 60 = 2 remainder 15

Step 4: Write the remainder in the smaller unit
The 2 groups are hours; the remainder of 15 stays as minutes.

ANSWER	135 minutes = **2 hours 15 minutes**

Worked Example 3.3 [2 marks]

Convert 200 seconds to minutes and seconds.

Step 1: Write the conversion fact
1 minute = 60 seconds

Step 2: Decide the operation
Seconds are smaller than minutes, so we are going from a smaller unit to a larger unit.
Smaller to larger means **divide** by 60.

Step 3: Divide and find the remainder
How many groups of 60 fit into 200?
3 × 60 = 180
200 − 180 = 20
So 200 ÷ 60 = 3 remainder 20

Step 4: Write the remainder in the smaller unit
The 3 groups are minutes; the remainder of 20 stays as seconds.

ANSWER	200 seconds = **3 minutes 20 seconds**

Worked Example 3.4 [2 marks]

Convert 50 days to weeks and days.

Step 1: Write the conversion fact
1 week = 7 days

Step 2: Decide the operation
Days are smaller than weeks, so we are going from a smaller unit to a larger unit.
Smaller to larger means **divide** by 7.

Step 3: Divide and find the remainder
How many groups of 7 fit into 50?
7 × 7 = 49
50 − 49 = 1
So 50 ÷ 7 = 7 remainder 1

Step 4: Write the remainder in the smaller unit
The 7 groups are weeks; the remainder of 1 stays as days.

ANSWER	50 days = **7 weeks 1 day**

Worked Example 3.5 [2 marks]

Convert 100 hours to days and hours.

Step 1: Write the conversion fact
1 day = 24 hours

Step 2: Decide the operation
Hours are smaller than days, so we are going from a smaller unit to a larger unit.
Smaller to larger means **divide** by 24.

Step 3: Divide and find the remainder
How many groups of 24 fit into 100?
4 × 24 = 96
100 − 96 = 4
So 100 ÷ 24 = 4 remainder 4

Step 4: Write the remainder in the smaller unit
The 4 groups are days; the remainder of 4 stays as hours.

ANSWER	100 hours = **4 days 4 hours**

Worked Example 3.6 [2 marks]

Convert 40 months to years and months.

Step 1: Write the conversion fact
1 year = 12 months

Step 2: Decide the operation
Months are smaller than years, so we are going from a smaller unit to a larger unit.
Smaller to larger means **divide** by 12.

Step 3: Divide and find the remainder
How many groups of 12 fit into 40?
3 × 12 = 36
40 − 36 = 4
So 40 ÷ 12 = 3 remainder 4

Step 4: Write the remainder in the smaller unit
The 3 groups are years; the remainder of 4 stays as months.

ANSWER	40 months = **3 years 4 months**

M Master: practice questions

Show your working in the space under each question. Answers are in the Answer Key at the back.

P3.1 [1 mark]

Convert 480 seconds to minutes.

P3.2 [2 marks]

Convert 170 minutes to hours and minutes.

P3.3 [2 marks]

Convert 250 seconds to minutes and seconds.

P3.4 [2 marks]

Convert 75 days to weeks and days.

P3.5 [2 marks]

Convert 60 hours to days and hours.

P3.6 [2 marks]

Convert 7,200 seconds to hours.

CONCEPT 4

Mixed units: converting, adding and subtracting

I Investigate

Many times are written using **two units**, such as 2 hours 30 minutes or 3 minutes 15 seconds. These are called **mixed units**.

To change a mixed unit time into the smaller unit, convert the larger part and then **add on** the smaller part:

$$2 \text{ h } 30 \text{ min} = (2 \times 60) + 30 = 120 + 30 = \mathbf{150 \text{ min}}$$

When **adding** times, add hours to hours and minutes to minutes. If the minutes reach 60 or more, **exchange** 60 minutes for 1 hour.

When **subtracting**, if there are not enough minutes, **exchange** 1 hour for 60 minutes first.

To **compare** or **order** times, convert them all to the same unit first.

KEY IDEA

Convert the larger part, then add the smaller part. When adding or subtracting, exchange 1 hour ⇄ 60 minutes (never 100).

WATCH OUT

- When subtracting 5 h 10 min − 2 h 35 min, exchanging 1 hour gives 4 h **70** min, not 4 h 110 min.
- 75 minutes is not a valid way to finish an answer in hours and minutes. Exchange to get 1 h 15 min.
- Do not compare 1 h 50 min with 115 min by looking at the digits. Convert to the same unit first.

S Solve: worked examples

Worked Example 4.1 [2 marks]

Convert 3 hours 25 minutes to minutes.

Step 1: Split the time into its parts
3 hours 25 minutes = 3 hours + 25 minutes

Step 2: Convert the hours to minutes
1 hour = 60 minutes, so multiply by 60.
3 × 60 = 180 minutes

Step 3: Add on the minutes
180 + 25 = 205

ANSWER	205 minutes

Worked Example 4.2 [2 marks]

Convert 4 minutes 35 seconds to seconds.

Step 1: Split the time into its parts
4 minutes 35 seconds = 4 minutes + 35 seconds

Step 2: Convert the minutes to seconds
1 minute = 60 seconds, so multiply by 60.
4 × 60 = 240 seconds

Step 3: Add on the seconds
240 + 35 = 275

ANSWER	275 seconds

Worked Example 4.3 [2 marks]

Convert 2 weeks 3 days to days.

Step 1: Split the time into its parts
2 weeks 3 days = 2 weeks + 3 days

Step 2: Convert the weeks to days
1 week = 7 days, so multiply by 7.
2 × 7 = 14 days

Step 3: Add on the days
14 + 3 = 17

ANSWER	17 days

Worked Example 4.4 [2 marks]

Add: 2 h 45 min + 1 h 30 min

Step 1: Add the hours
2 h + 1 h = 3 h

Step 2: Add the minutes
45 min + 30 min = 75 min

Step 3: Exchange 60 minutes for 1 hour
75 min is more than 60 min.
75 min = 60 min + 15 min = 1 h 15 min

Step 4: Combine
3 h + 1 h 15 min = 4 h 15 min

ANSWER	4 h 15 min

Worked Example 4.5 [2 marks]

Subtract: 5 h 10 min − 2 h 35 min

Step 1: Check the minutes
We need to take 35 min from 10 min, but 10 is smaller than 35.

Step 2: Exchange 1 hour for 60 minutes
5 h 10 min = 4 h + 60 min + 10 min = 4 h 70 min

Step 3: Subtract the minutes
70 min − 35 min = 35 min

Step 4: Subtract the hours
4 h − 2 h = 2 h

ANSWER	2 h 35 min

Worked Example 4.6 [2 marks]

Which is longer, 1 h 50 min or 115 minutes? By how much?

Step 1: Convert to the same unit

1 h 50 min = 60 min + 50 min = 110 min

Step 2: Compare

110 min and 115 min

115 is greater than 110.

Step 3: Find the difference

115 − 110 = 5 min

ANSWER	**115 minutes** is longer, by **5 minutes**.

M Master: practice questions

Show your working in the space under each question. Answers are in the Answer Key at the back.

P4.1 [2 marks]

Convert 2 hours 40 minutes to minutes.

P4.2 [2 marks]

Convert 6 minutes 15 seconds to seconds.

P4.3 [2 marks]

Convert 3 days 5 hours to hours.

P4.4 [2 marks]

Add: 1 h 35 min + 2 h 50 min

P4.5 [2 marks]

Subtract: 6 h 5 min − 2 h 30 min

P4.6 [2 marks]

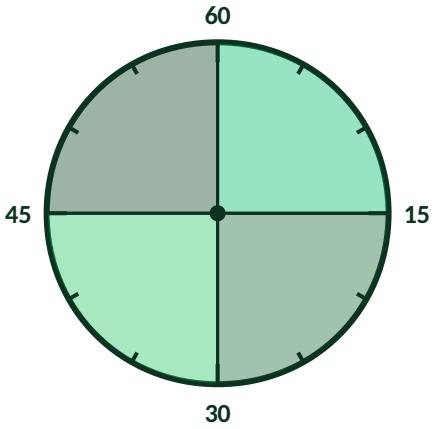
Order these times from shortest to longest: 2 h 5 min 130 minutes 1 h 55 min

CONCEPT 5

Decimals and fractions of an hour

I Investigate

Times are sometimes written with **decimals** or **fractions**, such as 2.5 hours or $\frac{3}{4}$ of an hour. Because there are 60 minutes in an hour (not 100), we must find that part **of 60**.



Decimal of an hour	Minutes
0.1 h	**6 min**
0.2 h	**12 min**
0.25 h (¼)	**15 min**
0.5 h (½)	**30 min**
0.75 h (¾)	**45 min**
1 h	**60 min**

Each quarter of the clock is 15 minutes, which is 0.25 of an hour.

Decimal or fraction → minutes: find that fraction of 60. For example, 0.1 of an hour is 60 ÷ 10 = 6 minutes, so 0.3 of an hour is 3 × 6 = 18 minutes.

Minutes → fraction or decimal of an hour: write the minutes over 60 and simplify. For example, 15 minutes = $\frac{15}{60}$ = $\frac{1}{4}$ = 0.25 of an hour.

KEY IDEA

Fraction or decimal of an hour → minutes: find that part of 60.
Minutes → part of an hour: write it over 60, then simplify.

WATCH OUT

- 1.3 hours is **not** 1 h 30 min. The 0.3 means 0.3 of 60 minutes = 18 minutes, so 1.3 hours = 1 h 18 min.
- 0.5 of an hour is 30 minutes, **not** 50 minutes.
- On a stopwatch or calculator, 2.5 hours does not mean 2 h 5 min.

S Solve: worked examples

Worked Example 5.1 [2 marks]

Convert 2.5 hours to hours and minutes.

Step 1: Split the whole and decimal parts
2.5 hours = 2 hours + 0.5 of an hour

Step 2: Convert the decimal part to minutes
0.5 means one half.
Half of 60 minutes = 60 ÷ 2 = 30 minutes

Step 3: Combine
2 hours + 30 minutes

ANSWER	2.5 hours = **2 h 30 min**

Worked Example 5.2 [2 marks]

Convert 1.25 hours to minutes.

Step 1: Split the whole and decimal parts
1.25 hours = 1 hour + 0.25 of an hour

Step 2: Convert each part to minutes
1 hour = 60 minutes
0.25 means one quarter.
One quarter of 60 = 60 ÷ 4 = 15 minutes

Step 3: Add
60 + 15 = 75 minutes

ANSWER	1.25 hours = **75 minutes**

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Worked Example 5.3 [2 marks]

How many minutes are there in $\frac{3}{4}$ of an hour?

Step 1: Write what we need

$\frac{3}{4}$ of 60 minutes

Step 2: Divide by the denominator

$60 \div 4 = 15$ (this is one quarter)

Step 3: Multiply by the numerator

$15 \times 3 = 45$ (three quarters)

ANSWER	$\frac{3}{4}$ of an hour = **45 minutes**

Worked Example 5.4 [2 marks]

Convert 1.3 hours to hours and minutes.

Step 1: Split the whole and decimal parts

1.3 hours = 1 hour + 0.3 of an hour

Step 2: Convert the decimal part to minutes

$0.3 \times 60 = 18$ (think $3 \times 60 = 180$, then $180 \div 10 = 18$)

Step 3: Combine

1 hour + 18 minutes

ANSWER	1.3 hours = **1 h 18 min** (not 1 h 30 min)

Worked Example 5.5 [2 marks]

Write 90 minutes in hours, as a decimal.

Step 1: Split into whole hours and minutes

90 minutes = 60 minutes + 30 minutes = 1 hour + 30 minutes

Step 2: Write the minutes as a fraction of an hour

30 minutes = $\frac{30}{60}$ of an hour = $\frac{1}{2}$ of an hour

Step 3: Write as a decimal

$\frac{1}{2} = 0.5$

$1 + 0.5 = 1.5$

ANSWER	90 minutes = **1.5 hours**

Worked Example 5.6 [2 marks]

Write 20 minutes as a fraction of an hour in its simplest form.

Step 1: Write as a fraction of 60

There are 60 minutes in an hour, so 20 minutes = $\frac{20}{60}$ of an hour.

Step 2: Simplify

The highest common factor of 20 and 60 is 20.

$\frac{20}{60} = \frac{20 \div 20}{60 \div 20} = \frac{1}{3}$

ANSWER	20 minutes = $\frac{1}{3}$ of an hour

M Master: practice questions

Show your working in the space under each question. Answers are in the Answer Key at the back.

P5.1 [2 marks]

Convert 3.5 hours to hours and minutes.

P5.2 [2 marks]

Convert 2.75 hours to minutes.

P5.3 [2 marks]

How many minutes are there in $\frac{2}{5}$ of an hour?

P5.4 [2 marks]

Convert 4.2 hours to hours and minutes.

P5.5 [2 marks]

Write 45 minutes in hours, as a decimal.

P5.6 [2 marks]

Convert 2.4 minutes to seconds.

CONCEPT 6

Solving problems with time

I Investigate

Real problems often need **more than one step**. A good plan is:

1. **Read** the question and underline the units given and the unit the answer needs.
2. **Convert** everything into the same unit (usually the smaller one).
3. **Calculate**: add, subtract, multiply or divide.
4. **Convert back** into the unit the question asks for.
5. **Check**: is the answer sensible?

For finishing times, use a **number line**: jump the whole hours first, then the minutes. Bridging through the next o'clock time keeps the working simple.

KEY IDEA

Convert to one unit → calculate → convert back to the unit asked for → check it makes sense.

WATCH OUT

- Always give the answer in the unit the question asks for (for example hours and minutes, not just minutes).
- When a start time is 19:50 and you add 18 minutes, bridge through 20:00 (10 minutes) then add the other 8. Do not write 19:68.
- Check your answer makes sense: a 45 minute daily swim for 2 weeks cannot be 2 hours in total.

S Solve: worked examples

Worked Example 6.1 [3 marks]

A swimmer trains for 45 minutes every day for 2 weeks. How long does she train altogether? Give your answer in hours and minutes.

Step 1: Find the number of days
2 weeks = 2 × 7 = 14 days

Step 2: Find the total minutes
14 × 45 = 10 × 45 + 4 × 45 = 450 + 180 = 630 minutes

Step 3: Convert to hours and minutes
630 ÷ 60: 10 × 60 = 600
630 − 600 = 30
So 630 minutes = 10 hours 30 minutes

ANSWER	**10 h 30 min**

Worked Example 6.2 [3 marks]

Tolu is 11 years 7 months old. His sister is 98 months old. Who is older, and by how much? Give your answer in years and months.

Step 1: Convert Tolu's age to months
11 years = 11 × 12 = 132 months
132 + 7 = 139 months

Step 2: Compare
Tolu: 139 months. Sister: 98 months. Tolu is older.

Step 3: Find the difference
139 − 98 = 41 months

Step 4: Convert to years and months
41 ÷ 12: 3 × 12 = 36
41 − 36 = 5
41 months = 3 years 5 months

ANSWER	**Tolu** is older, by **3 years 5 months**.

Worked Example 6.3 [3 marks]

A train leaves at 08:45. The journey takes 2.75 hours. At what time does the train arrive?

Step 1: Convert the decimal hours
2.75 hours = 2 hours + 0.75 of an hour
0.75 of 60 minutes = 45 minutes
So the journey is 2 h 45 min.

Step 2: Add the whole hours first
08:45 + 2 hours = 10:45

Step 3: Add the minutes
10:45 + 45 minutes
15 minutes takes us to 11:00, then 30 more minutes takes us to 11:30



ANSWER	11:30

Worked Example 6.4 [3 marks]

A clock loses 3 seconds every hour. How much time does it lose in 1 week? Give your answer in minutes and seconds.

Step 1: Find the hours in a week
1 week = 7 days
7 × 24 = 168 hours

Step 2: Find the total seconds lost
168 × 3 = 504 seconds

Step 3: Convert to minutes and seconds
504 ÷ 60: 8 × 60 = 480
504 − 480 = 24
504 seconds = 8 minutes 24 seconds

ANSWER	8 min 24 s

Worked Example 6.5 [3 marks]

A machine stamps 72 labels every minute. How many labels does it stamp in 2.5 hours?

Step 1: Convert the time to minutes

2.5 hours = 2 hours + 0.5 of an hour

2 × 60 = 120 minutes; 0.5 of 60 = 30 minutes

120 + 30 = 150 minutes

Step 2: Multiply by the labels per minute

150 × 72 = 150 × 70 + 150 × 2

= 10,500 + 300

= 10,800

ANSWER	10,800 labels

Worked Example 6.6 [3 marks]

A school day has 5 lessons of 55 minutes, 2 breaks of 20 minutes and a lunch of 45 minutes. How long is the school day in hours?

Step 1: Find the lesson time

5 × 55 = 275 minutes

Step 2: Find the break time

2 × 20 = 40 minutes

Step 3: Add everything

275 + 40 + 45 = 360 minutes

Step 4: Convert to hours

360 ÷ 60 = 6 hours

ANSWER	6 hours

M Master: practice questions

Show your working in the space under each question. Answers are in the Answer Key at the back.

P6.1 [3 marks]

Kemi reads for 35 minutes every day for 3 weeks. How long does she read altogether? Give your answer in hours and minutes.

P6.2 [3 marks]

Ben is 10 years 9 months old. His cousin is 115 months old. Who is older, and by how much? Give your answer in years and months.

P6.3 [3 marks]

A bus leaves at 13:20. The journey takes 1.5 hours. At what time does it arrive?

P6.4 [3 marks]

A clock gains 5 seconds every hour. How much time does it gain in 3 days? Give your answer in minutes.

P6.5 [3 marks]

A printer prints 45 pages every minute. How many pages does it print in 1.25 hours?

P6.6 [3 marks]

A film lasts 2 h 18 min. It starts at 19:50. At what time does it finish?

CHALLENGE

Outperform

These questions bring several skills together. Plan your route before you start calculating.

Q1 [3 marks]

How many seconds are there in one week?

Q2 [4 marks]

Which is longer: 0.4 of a day, or 9 hours 30 minutes? By how much?

Q3 [4 marks]

Order these from shortest to longest: $\frac{3}{4}$ of an hour 0.7 hours 2,650 seconds

Q4 [4 marks]

A runner completes one lap in 1 min 48 s. She runs 40 laps at this speed. How long does she run for, in hours and minutes?

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SUMMARY

Time conversion at a glance

The facts

60 s = 1 min || 60 min = 1 h

24 h = 1 day || 7 days = 1 week

12 months = 1 year || 365 days = 1 year

10 years = 1 decade || 100 years = 1 century

Which way?

Larger → smaller: **multiply**

Smaller → larger: **divide**

No direct fact? Go one step at a time along the ladder.

Remainders

135 min ÷ 60 = 2 r 15

→ 2 h 15 min

The remainder stays in the smaller unit.

Mixed units

3 h 25 min = 3 × 60 + 25 = 205 min

Adding: exchange 60 min → 1 h

Subtracting: exchange 1 h → 60 min

Parts of an hour

0.25 h = 15 min 0.5 h = 30 min

0.75 h = 45 min 0.1 h = 6 min

$\frac{1}{3}$ h = 20 min $\frac{2}{5}$ h = 24 min

Problem plan

1. Read and underline units
2. Convert to one unit
3. Calculate
4. Convert back 5. Check

REMEMBER

Time is **not** base ten. 1.3 hours = 1 h 18 min, and 90 minutes = 1.5 hours.

ANSWER KEY

Answer Summary

Question	Answer	Marks
P1.1	84 months	1
P1.2	63 days	1
P1.3	500 years	1
P1.4	100 decades	2
P1.5	2024 and 2032	2
P1.6	92 days	2
P2.1	720 seconds	1
P2.2	540 minutes	1
P2.3	72 hours	1
P2.4	7,200 seconds	2
P2.5	4,320 minutes	2
P2.6	168 hours	2
P3.1	8 minutes	1
P3.2	2 hours 50 minutes	2
P3.3	4 minutes 10 seconds	2
P3.4	10 weeks 5 days	2
P3.5	2 days 12 hours	2
P3.6	2 hours	2
P4.1	160 minutes	2
P4.2	375 seconds	2
P4.3	77 hours	2
P4.4	4 h 25 min	2
P4.5	3 h 35 min	2
P4.6	1 h 55 min, 2 h 5 min, 130 min	2

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P5.1	**3 h 30 min**		2
P5.2	**165 minutes**		2
P5.3	**24 minutes**		2
P5.4	**4 h 12 min**		2
P5.5	**0.75 hours**		2
P5.6	**144 seconds**		2
P6.1	**12 h 15 min**		3
P6.2	**Ben, by 1 year 2 months**		3
P6.3	**14:50**		3
P6.4	**6 minutes**		3
P6.5	**3,375 pages**		3
P6.6	**22:08**		3
O1	**604,800 seconds**		3
O2	**0.4 of a day, by 6 min**		4
O3	**0.7 h, 2,650 s, $\frac{3}{4}$ h**		4
O4	**1 h 12 min**		4
		Total	**86**

ANSWER KEY

Full worked solutions

Concept 1: Units of time and how they link

Question P1.1 [1 mark]

How many months are there in 7 years?

Step 1: Write the conversion fact
1 year = 12 months

Step 2: Decide the operation
Years are larger than months, so we are going from a larger unit to a smaller unit.
Larger to smaller means **multiply** by 12.

Step 3: Calculate
7 × 12 = 84

ANSWER	7 years = **84 months**

Question P1.2 [1 mark]

How many days are there in 9 weeks?

Step 1: Write the conversion fact
1 week = 7 days

Step 2: Decide the operation
Weeks are larger than days, so we are going from a larger unit to a smaller unit.
Larger to smaller means **multiply** by 7.

Step 3: Calculate
9 × 7 = 63

ANSWER	9 weeks = **63 days**

Question P1.3 [1 mark]

How many years are there in 5 centuries?

Step 1: Write the conversion fact
1 century = 100 years

Step 2: Decide the operation
Centuries are larger than years, so we are going from a larger unit to a smaller unit.
Larger to smaller means **multiply** by 100.

Step 3: Calculate
5 × 100 = 500

ANSWER	5 centuries = **500 years**

Question P1.4 [2 marks]

A millennium is 1,000 years. How many decades are there in a millennium?

Step 1: Write the conversion fact
1 decade = 10 years

Step 2: Decide the operation
Years are smaller than decades, so we are going from a smaller unit to a larger unit.
Smaller to larger means **divide** by 10.

Step 3: Calculate
1,000 ÷ 10 = 100
Check: 100 × 10 = 1,000 ✓

ANSWER	1,000 years = **100 decades**

Question P1.5 [2 marks]

Which of these years are leap years? 2024 2026 2032

Step 1: Recall the leap year rule
Years that divide exactly by 4 are leap years.

Step 2: Divide each year by 4
2024 ÷ 4 = 506 (no remainder)
2026 ÷ 4 = 506 remainder 2
2032 ÷ 4 = 508 (no remainder)

Step 3: Make the decision
2024 and 2032 divide exactly by 4. 2026 leaves a remainder, so it is not a leap year.

ANSWER	**2024 and 2032**

Question P1.6 [2 marks]

How many days are there altogether in July, August and September?

Step 1: Recall the days in each month
July has 31 days.
August has 31 days.
September has 30 days.

Step 2: Add them together
31 + 31 + 30 = 92

ANSWER	**92 days**

Concept 2: Converting from larger units to smaller units

Question P2.1 [1 mark]

Convert 12 minutes to seconds.

Step 1: Write the conversion fact
1 minute = 60 seconds

Step 2: Decide the operation
Minutes are larger than seconds, so we are going from a larger unit to a smaller unit.
Larger to smaller means **multiply** by 60.

Step 3: Calculate
12 × 60 = 720

ANSWER	12 minutes = **720 seconds**

Question P2.2 [1 mark]

Convert 9 hours to minutes.

Step 1: Write the conversion fact
1 hour = 60 minutes

Step 2: Decide the operation
Hours are larger than minutes, so we are going from a larger unit to a smaller unit.
Larger to smaller means **multiply** by 60.

Step 3: Calculate
9 × 60 = 540

ANSWER	9 hours = **540 minutes**

Question P2.3 [1 mark]

Convert 3 days to hours.

Step 1: Write the conversion fact
1 day = 24 hours

Step 2: Decide the operation
Days are larger than hours, so we are going from a larger unit to a smaller unit.
Larger to smaller means **multiply** by 24.

Step 3: Calculate
3 × 24 = 72

ANSWER	3 days = **72 hours**

Question P2.4 [2 marks]

Convert 2 hours to seconds.

Step 1: Plan the route
There is no single fact for this, so convert one step at a time:
hours → minutes → seconds

Step 2: Convert hours to minutes
1 hour = 60 minutes, so multiply by 60.
2 × 60 = 120 minutes

Step 3: Convert minutes to seconds
1 minute = 60 seconds, so multiply by 60.
120 × 60 = 7,200 seconds

ANSWER	**7,200 seconds**

Question P2.5 [2 marks]

Convert 3 days to minutes.

Step 1: Plan the route
There is no single fact for this, so convert one step at a time:
days → hours → minutes

Step 2: Convert days to hours
1 day = 24 hours, so multiply by 24.
3 × 24 = 72 hours

Step 3: Convert hours to minutes
1 hour = 60 minutes, so multiply by 60.
72 × 60 = 4,320 minutes

ANSWER	4,320 minutes

Question P2.6 [2 marks]

A book festival lasts exactly 1 week. How many hours is that?

Step 1: Plan the route
There is no single fact for this, so convert one step at a time:
weeks → days → hours

Step 2: Convert weeks to days
1 week = 7 days, so multiply by 7.
1 × 7 = 7 days

Step 3: Convert days to hours
1 day = 24 hours, so multiply by 24.
7 × 24 = 168 hours

ANSWER	168 hours

Concept 3: Converting from smaller units to larger units

Question P3.1 [1 mark]

Convert 480 seconds to minutes.

Step 1: Write the conversion fact
1 minute = 60 seconds

Step 2: Decide the operation
Seconds are smaller than minutes, so we are going from a smaller unit to a larger unit.
Smaller to larger means **divide** by 60.

Step 3: Calculate
480 ÷ 60 = 8
Check: 8 × 60 = 480 ✓

ANSWER	480 seconds = **8 minutes**

Question P3.2 [2 marks]

Convert 170 minutes to hours and minutes.

Step 1: Write the conversion fact
1 hour = 60 minutes

Step 2: Decide the operation
Minutes are smaller than hours, so we are going from a smaller unit to a larger unit.
Smaller to larger means **divide** by 60.

Step 3: Divide and find the remainder
How many groups of 60 fit into 170?
2 × 60 = 120
170 − 120 = 50
So 170 ÷ 60 = 2 remainder 50

Step 4: Write the remainder in the smaller unit
The 2 groups are hours; the remainder of 50 stays as minutes.

ANSWER	170 minutes = **2 hours 50 minutes**

Question P3.3 [2 marks]

Convert 250 seconds to minutes and seconds.

Step 1: Write the conversion fact
1 minute = 60 seconds

Step 2: Decide the operation
Seconds are smaller than minutes, so we are going from a smaller unit to a larger unit.
Smaller to larger means **divide** by 60.

Step 3: Divide and find the remainder
How many groups of 60 fit into 250?
4 × 60 = 240
250 − 240 = 10
So 250 ÷ 60 = 4 remainder 10

Step 4: Write the remainder in the smaller unit
The 4 groups are minutes; the remainder of 10 stays as seconds.

ANSWER	250 seconds = **4 minutes 10 seconds**

Question P3.4 [2 marks]

Convert 75 days to weeks and days.

Step 1: Write the conversion fact
1 week = 7 days

Step 2: Decide the operation
Days are smaller than weeks, so we are going from a smaller unit to a larger unit.
Smaller to larger means **divide** by 7.

Step 3: Divide and find the remainder
How many groups of 7 fit into 75?
10 × 7 = 70
75 − 70 = 5
So 75 ÷ 7 = 10 remainder 5

Step 4: Write the remainder in the smaller unit
The 10 groups are weeks; the remainder of 5 stays as days.

ANSWER	75 days = **10 weeks 5 days**

Question P3.5 [2 marks]

Convert 60 hours to days and hours.

Step 1: Write the conversion fact
1 day = 24 hours

Step 2: Decide the operation
Hours are smaller than days, so we are going from a smaller unit to a larger unit.
Smaller to larger means **divide** by 24.

Step 3: Divide and find the remainder
How many groups of 24 fit into 60?
$2 \times 24 = 48$
$60 - 48 = 12$
So $60 \div 24 = 2$ remainder 12

Step 4: Write the remainder in the smaller unit
The 2 groups are days; the remainder of 12 stays as hours.

ANSWER	60 hours = **2 days 12 hours**

Question P3.6 [2 marks]

Convert 7,200 seconds to hours.

Step 1: Plan the route
There is no single fact, so go up the ladder one step at a time:
seconds → minutes → hours

Step 2: Convert seconds to minutes
60 seconds = 1 minute, so divide by 60.
$7{,}200 \div 60 = 120$ minutes

Step 3: Convert minutes to hours
60 minutes = 1 hour, so divide by 60.
$120 \div 60 = 2$ hours

ANSWER	7,200 seconds = **2 hours**

Concept 4: Mixed units: converting, adding and subtracting

Question P4.1 [2 marks]

Convert 2 hours 40 minutes to minutes.

Step 1: Split the time into its parts
2 hours 40 minutes = 2 hours + 40 minutes

Step 2: Convert the hours to minutes
1 hour = 60 minutes, so multiply by 60.
2 × 60 = 120 minutes

Step 3: Add on the minutes
120 + 40 = 160

ANSWER	160 minutes

Question P4.2 [2 marks]

Convert 6 minutes 15 seconds to seconds.

Step 1: Split the time into its parts
6 minutes 15 seconds = 6 minutes + 15 seconds

Step 2: Convert the minutes to seconds
1 minute = 60 seconds, so multiply by 60.
6 × 60 = 360 seconds

Step 3: Add on the seconds
360 + 15 = 375

ANSWER	375 seconds

Question P4.3 [2 marks]

Convert 3 days 5 hours to hours.

Step 1: Split the time into its parts
3 days 5 hours = 3 days + 5 hours

Step 2: Convert the days to hours
1 day = 24 hours, so multiply by 24.
3 × 24 = 72 hours

Step 3: Add on the hours
72 + 5 = 77

ANSWER	77 hours

Question P4.4 [2 marks]

Add: 1 h 35 min + 2 h 50 min

Step 1: Add the hours
1 h + 2 h = 3 h

Step 2: Add the minutes
35 min + 50 min = 85 min

Step 3: Exchange 60 minutes for 1 hour
85 min = 60 min + 25 min = 1 h 25 min

Step 4: Combine
3 h + 1 h 25 min = 4 h 25 min

ANSWER	4 h 25 min

Question P4.5 [2 marks]

Subtract: 6 h 5 min − 2 h 30 min

Step 1: Check the minutes
We need to take 30 min from 5 min, but 5 is smaller than 30.

Step 2: Exchange 1 hour for 60 minutes
6 h 5 min = 5 h + 60 min + 5 min = 5 h 65 min

Step 3: Subtract the minutes
65 min − 30 min = 35 min

Step 4: Subtract the hours
5 h − 2 h = 3 h

ANSWER	3 h 35 min

Question P4.6 [2 marks]

Order these times from shortest to longest: 2 h 5 min 130 minutes 1 h 55 min

Step 1: Convert every time to minutes
2 h 5 min = 120 + 5 = 125 min
130 minutes = 130 min
1 h 55 min = 60 + 55 = 115 min

Step 2: Order the minutes
115 min, 125 min, 130 min

Step 3: Write them in their original form
1 h 55 min, 2 h 5 min, 130 minutes

ANSWER	**1 h 55 min, 2 h 5 min, 130 minutes**

Concept 5: Decimals and fractions of an hour

Question P5.1 [2 marks]

Convert 3.5 hours to hours and minutes.

Step 1: Split the whole and decimal parts
3.5 hours = 3 hours + 0.5 of an hour

Step 2: Convert the decimal part to minutes
0.5 × 60 = 30 minutes

Step 3: Combine
3 hours + 30 minutes

ANSWER	3.5 hours = **3 h 30 min**

Question P5.2 [2 marks]

Convert 2.75 hours to minutes.

Step 1: Split the whole and decimal parts
2.75 hours = 2 hours + 0.75 of an hour

Step 2: Convert each part to minutes
2 × 60 = 120 minutes
0.75 means three quarters: 60 ÷ 4 = 15, then 15 × 3 = 45 minutes

Step 3: Add
120 + 45 = 165 minutes

ANSWER	2.75 hours = **165 minutes**

Question P5.3 [2 marks]

How many minutes are there in $\frac{2}{5}$ of an hour?

Step 1: Write what we need

$\frac{2}{5}$ of 60 minutes

Step 2: Divide by the denominator

$60 \div 5 = 12$

Step 3: Multiply by the numerator

$12 \times 2 = 24$

ANSWER	$\frac{2}{5}$ of an hour = **24 minutes**

Question P5.4 [2 marks]

Convert 4.2 hours to hours and minutes.

Step 1: Split the whole and decimal parts

4.2 hours = 4 hours + 0.2 of an hour

Step 2: Convert the decimal part to minutes

$0.2 \times 60 = 12$ (think $2 \times 60 = 120$, then $120 \div 10 = 12$)

Step 3: Combine

4 hours + 12 minutes

ANSWER	4.2 hours = **4 h 12 min**

Question P5.5 [2 marks]

Write 45 minutes in hours, as a decimal.

Step 1: Write as a fraction of an hour

45 minutes = $\frac{45}{60}$ of an hour

Step 2: Simplify

$\frac{45}{60} = \frac{45 \div 15}{60 \div 15} = \frac{3}{4}$

Step 3: Write as a decimal

$\frac{3}{4} = 0.75$

ANSWER	45 minutes = **0.75 hours**

Question P5.6 [2 marks]

Convert 2.4 minutes to seconds.

Step 1: Split the whole and decimal parts
2.4 minutes = 2 minutes + 0.4 of a minute

Step 2: Convert each part to seconds
2 × 60 = 120 seconds
0.4 × 60 = 24 seconds (4 × 60 = 240, then 240 ÷ 10 = 24)

Step 3: Add
120 + 24 = 144 seconds

ANSWER	2.4 minutes = **144 seconds**

Concept 6: Solving problems with time

Question P6.1 [3 marks]

Kemi reads for 35 minutes every day for 3 weeks. How long does she read altogether? Give your answer in hours and minutes.

Step 1: Find the number of days
3 weeks = 3 × 7 = 21 days

Step 2: Find the total minutes
21 × 35 = 20 × 35 + 1 × 35 = 700 + 35 = 735 minutes

Step 3: Convert to hours and minutes
735 ÷ 60: 12 × 60 = 720
735 − 720 = 15
735 minutes = 12 hours 15 minutes

ANSWER	**12 h 15 min**

Question P6.2 [3 marks]

Ben is 10 years 9 months old. His cousin is 115 months old. Who is older, and by how much? Give your answer in years and months.

Step 1: Convert Ben's age to months
10 years = 10 × 12 = 120 months
120 + 9 = 129 months

Step 2: Compare
Ben: 129 months. Cousin: 115 months. Ben is older.

Step 3: Find the difference
129 − 115 = 14 months

Step 4: Convert to years and months
14 ÷ 12 = 1 remainder 2
14 months = 1 year 2 months

ANSWER **Ben** is older, by **1 year 2 months.**

Question P6.3 [3 marks]

A bus leaves at 13:20. The journey takes 1.5 hours. At what time does it arrive?

Step 1: Convert the decimal hours
1.5 hours = 1 hour + 0.5 of an hour
0.5 of 60 minutes = 30 minutes
So the journey is 1 h 30 min.

Step 2: Add the whole hours first
13:20 + 1 hour = 14:20

Step 3: Add the minutes
14:20 + 30 minutes
= 14:50



ANSWER **14:50**

Question P6.4 [3 marks]

A clock gains 5 seconds every hour. How much time does it gain in 3 days? Give your answer in minutes.

Step 1: Find the hours in 3 days
3 × 24 = 72 hours

Step 2: Find the total seconds gained
72 × 5 = 360 seconds

Step 3: Convert to minutes
360 ÷ 60 = 6 minutes

ANSWER	6 minutes

Question P6.5 [3 marks]

A printer prints 45 pages every minute. How many pages does it print in 1.25 hours?

Step 1: Convert the time to minutes
1.25 hours = 1 hour + 0.25 of an hour
60 minutes + 15 minutes = 75 minutes

Step 2: Multiply by the pages per minute
75 × 45 = 75 × 40 + 75 × 5
= 3,000 + 375
= 3,375

ANSWER	3,375 pages

Question P6.6 [3 marks]

A film lasts 2 h 18 min. It starts at 19:50. At what time does it finish?

Step 1: Add the whole hours first
19:50 + 2 hours = 21:50

Step 2: Add the minutes
21:50 + 18 minutes
10 minutes takes us to 22:00, then 8 more minutes takes us to 22:08



ANSWER	22:08

Outperform

Challenge O1 [3 marks]

How many seconds are there in one week?

Step 1: Plan the route
weeks → days → hours → minutes → seconds

Step 2: Convert weeks to days
1 × 7 = 7 days

Step 3: Convert days to hours
7 × 24 = 168 hours

Step 4: Convert hours to minutes
168 × 60 = 10,080 minutes

Step 5: Convert minutes to seconds
10,080 × 60 = 604,800 seconds

ANSWER	**604,800 seconds**

Challenge O2 [4 marks]

Which is longer: 0.4 of a day, or 9 hours 30 minutes? By how much?

Step 1: Convert 0.4 of a day to hours
0.4 × 24 = 9.6 hours (4 × 24 = 96, then 96 ÷ 10 = 9.6)

Step 2: Convert the decimal part to minutes
9.6 hours = 9 hours + 0.6 of an hour
0.6 × 60 = 36 minutes
So 0.4 of a day = 9 h 36 min

Step 3: Compare
9 h 36 min and 9 h 30 min: 36 minutes is more than 30 minutes.

Step 4: Find the difference
36 − 30 = 6 minutes

ANSWER	**0.4 of a day** is longer, by **6 minutes**.

Challenge O3 [4 marks]

Order these from shortest to longest: $\frac{3}{4}$ of an hour 0.7 hours 2,650 seconds

Step 1: Convert each to minutes first

$\frac{3}{4}$ of an hour = 45 minutes

0.7 hours = 0.7 × 60 = 42 minutes

Step 2: Convert each to seconds

$\frac{3}{4}$ of an hour: 45 × 60 = 2,700 seconds

0.7 hours: 42 × 60 = 2,520 seconds

2,650 seconds stays as 2,650 seconds

Step 3: Order

2,520 < 2,650 < 2,700

ANSWER **0.7 hours, 2,650 seconds, $\frac{3}{4}$ of an hour**

Challenge O4 [4 marks]

A runner completes one lap in 1 min 48 s. She runs 40 laps at this speed. How long does she run for, in hours and minutes?

Step 1: Convert one lap to seconds

1 min 48 s = 60 + 48 = 108 seconds

Step 2: Find the total seconds

108 × 40 = 108 × 4 × 10 = 432 × 10 = 4,320 seconds

Step 3: Convert seconds to minutes

4,320 ÷ 60 = 72 minutes

Step 4: Convert minutes to hours and minutes

72 ÷ 60 = 1 remainder 12

72 minutes = 1 hour 12 minutes

ANSWER **1 h 12 min**